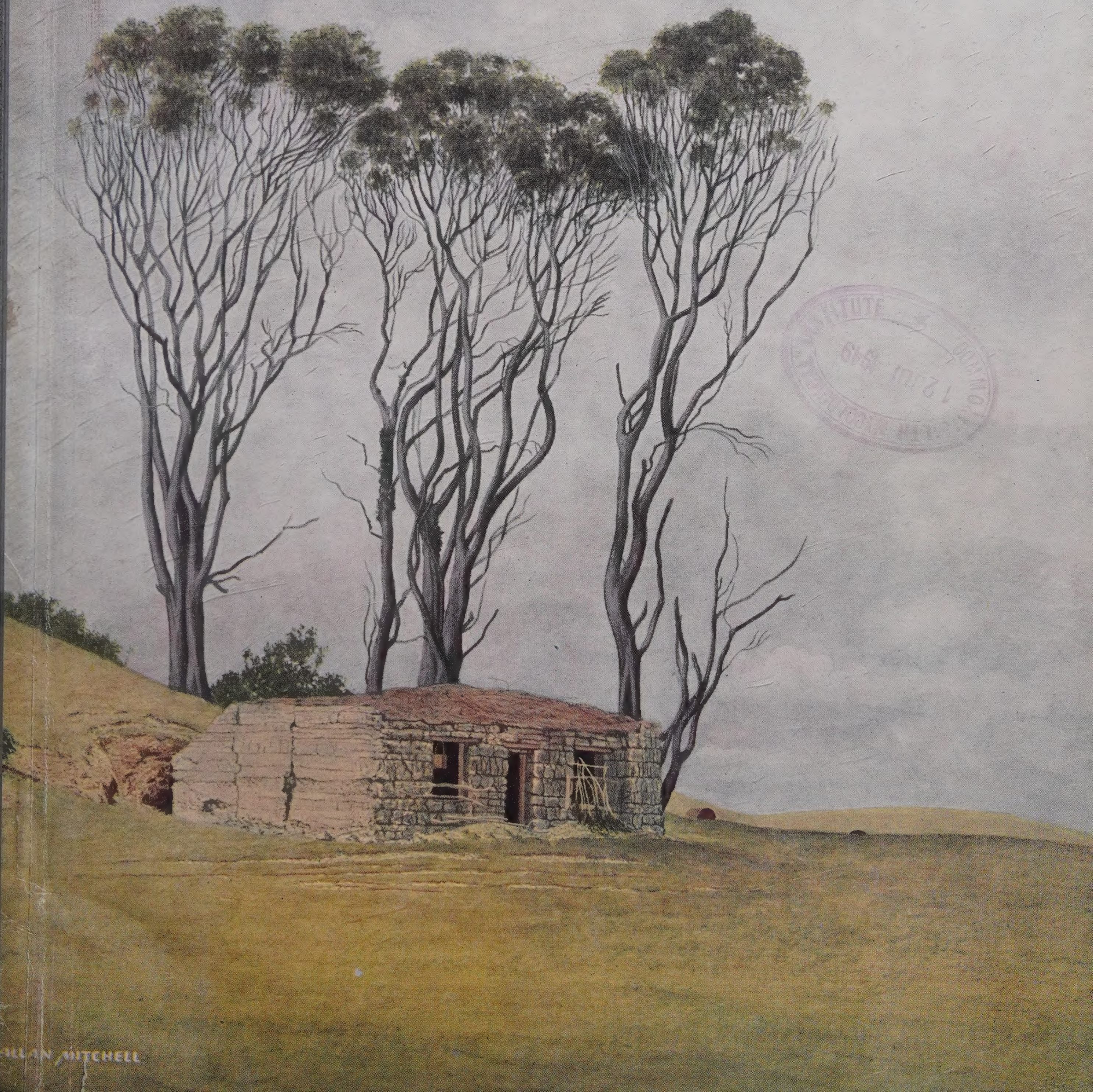
NEW ZEALAND
JOURNAL OF
Agriculture

MAY, 1949


ALLAN MITCHELL

STITUTE
DOMINIO
12 JUL 949

Transport Your Valuable Stock

by Air!

NO LOSS OF CONDITION . . .
SAVES TIME AND WORRY

It costs less than you may think to send stud and show stock by air—either on regular freighters, or by chartered aircraft. And you've the satisfaction of knowing that they'll arrive in peak condition, within a few hours of loading. Alert breeders throughout New Zealand are using Freightair for stock carrying . . . and finding that it pays. Enquire at your local N.A.C. office or Agent.

SEND STOCK

FREIGHTAIR

by N·A·C Freighters

NEW ZEALAND
NATIONAL AIRWAYS CORPORATION

NAC

Since

1872

THE

NATIONAL BANK

OF NEW ZEALAND
LIMITED

***The* WEEDONE *Service* means real**

WEED CONTROL

One of the many WEEDONE products will prove the answer to YOUR weed problem. The full resources of WEEDONE research, the full range of selective WEEDONE weedkillers, and the amazing economy of the latest WEEDONE methods, including Low Volume spraying, are putting literally hundreds of thousands of pounds into the pockets of farmers all over New Zealand today. The WEEDONE SERVICE means more production and more profitable production.

No matter what your previous experience of weed control has been, you owe it to yourself to get FREE ADVICE from your nearest WEEDONE Service Distributor.

For Free Expert Advice . . .

CONSULT YOUR NEAREST WEEDONE SERVICE DISTRIBUTOR.

Auckland District: F. M. Winstone (Seeds) Ltd.; *Manawatu - Rangitikei - Wanganui:* Abraham Seed and Produce Co. Ltd.; *Wellington and Nelson:* N.Z. Loan & Mercantile Agency Co. Ltd.; *Gisborne:* Common Shelton & Co. Ltd.; *Hawke's Bay:* H.B. Farmers' Co-op. (All Branches); *Taranaki:* Farmers' Co-op. (All branches); *Wairarapa:* W.F.C.A., Ltd. (All Branches); *Canterbury & West Coast:* Alex McDonald & Co., Christchurch; *Marlborough:* Wright, Stephenson & Co. Ltd., Blenheim; *Otago:* Bruce Christie & Co., Oamaru; *Southland:* South Island Dairy Association, Invercargill.

Manufactured for Australia and New Zealand by
IVON WATKINS LIMITED, Agricultural Chemicals Division,
32-34 CURRIE STREET, NEW PLYMOUTH.

Volume 78
Number 5
May 16,
1949.
(Established 1910)

NEW ZEALAND JOURNAL OF Agriculture

Published by
Direction
of
Hon. E. L. Cullen,
Minister of Agriculture.

This month's cover

As transport facilities were restricted to infrequent coastal services and access to inland areas often presented a problem, early settlers frequently had to build their homes from material close at hand. This month's cover, painted by Allan Mitchell and based on a photograph by Geo. Chance, F.R.P.S., Dunedin, shows the remains of an old mud farmhouse near Taieri Mouth, a small, picturesque farming and fishing settlement in Otago. The first farmers of the Taieri district confined their activities to hilly and undulating country rather than to the Taieri Plain, because the plain was too swampy and prone to flooding. However, as flood protection works were constructed and drainage provided farming became concentrated on the flats and today the plain is one of the main sources of dairy produce, fat cattle, lambs, meat, wool, and vegetables in Otago.

New Zealand Department of Agriculture

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington.

DIRECTOR-GENERAL:
E. J. Fawcett

ASSISTANT DIRECTOR-GENERAL:
R. B. Tennent

DIVISIONAL DIRECTORS:

Animal Research	J. F. Filmer
Dairy	H. A. Foy
Extension	P. W. Smallfield
Horticulture	A. M. W. Greig
Livestock	W. C. Barry

Editor: R. E. Owen

TABLE OF CONTENTS

Livestock Imports and Exports		435
Ploughing Grass for Root and Green Forage Crops		436
The Home Garden	A. G. Kennelly	437
Effect of Temperature of Washing Water on Rate of Machine Milking	W. G. Whittleston	446
Meteorological Records for March		446
Snow and Snow Raking on High-country Sheep Stations	J. L. McLean	447
Blower Equipment for Hill-country Topdressing	C. J. Hamblyn	452
Symptoms and Control of Fowl Pox	A. C. Howse	453
Standards of Efficiency of Pig Production	A. Longwill	455
Dairy Produce Graded for Export		460
Vaccination of Sheep for Enterotoxaemia, Blackleg, and "Scabby Mouth"	C. V. Dayus	461
Nutrition of the Grapevine	F. Berry Smith	465
Trapping of Opossums and Care of Skins	L. T. Pracy and R. I. Kean	469
The Principles of Poultry Breeding	F. C. Bobby	481
Orchard Cultivation Methods in Hawke's Bay	T. Conway	483
Subterranean Clover as a Fertility Builder	A. J. Coughlan	489
Planning and Planting the Mixed Border	H. P. Thomas	493
Spraying Experiments for Control of Grass-grub in South Taranaki	E. M. Bates	496
Care of Livestock during June		503
Mangolds Crop Heavily on Heretaunga Plains	R. P. Hill	504
Radio Broadcasts		504
Household Poultry	W. L. McIver	505
Spartina townsendii: A valuable Grass on Tidal Mud Flats	W. L. Harbord	507
Commercial Orchard Spraying Equipment	R. Viney	509
The Flower Garden	M. J. Barnett	513
New Zealand Young Farmer Second in Leadership Contest at Sydney Royal Show		519
Recovery of Honey and Beeswax from Cappings and Combs	L. H. Johnson	523
Parents' Role in the Child's Early Years	Dorothy Johnson	525
Appetising Fish Meals	Eva Topping	529
Royal Visitors to New Zealand: The Duke and Duchess of York	Enid B. V. Phillips	533
Set of Dressing-table Mats		536
Loose Covers for Furniture	Eva Topping	537
The Choice between Making and Buying	Norma K. Metson	543

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available at 3d. a copy, post free.

COPYRIGHT PROVISIONS

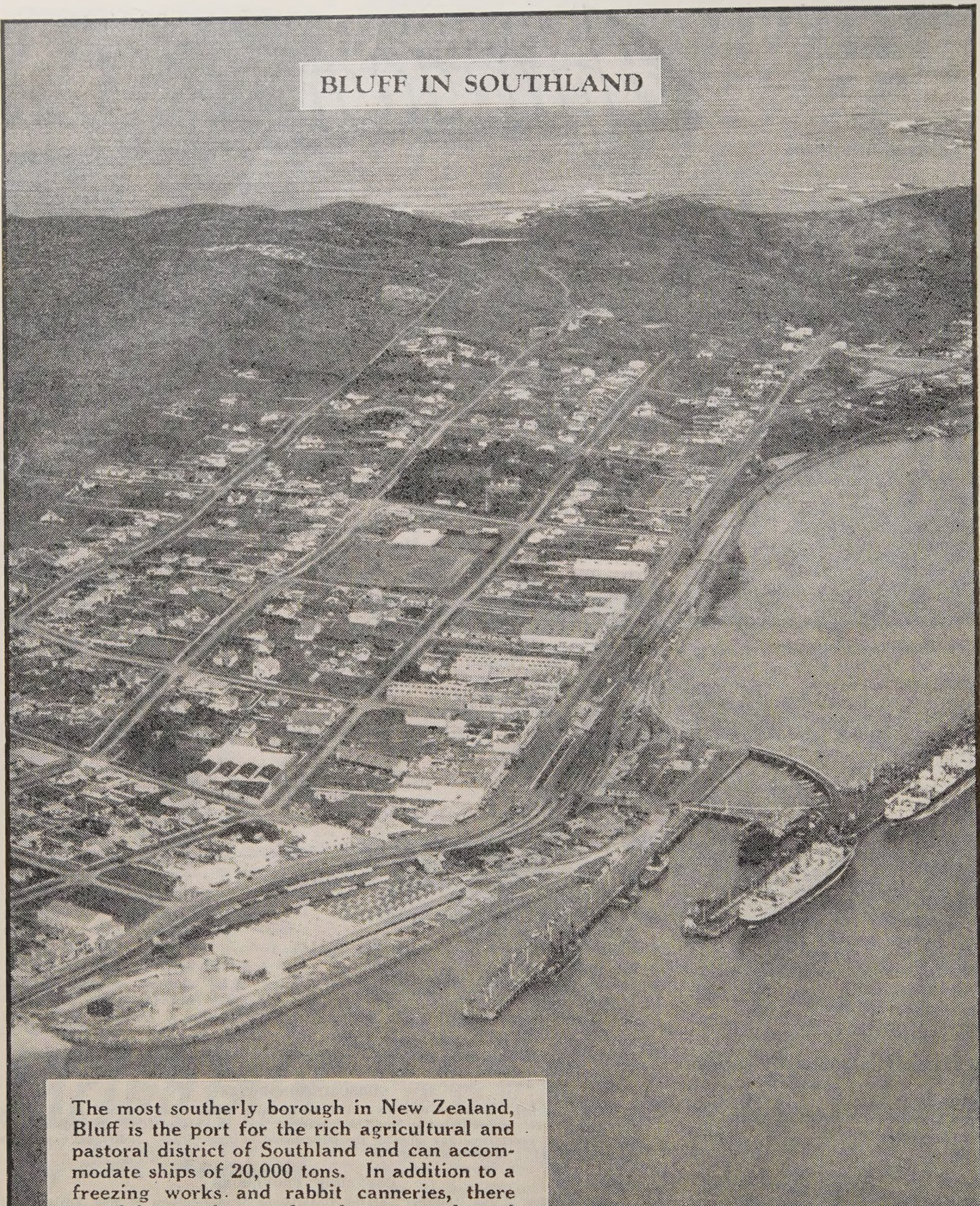
The articles in the "Journal" of the Department of Agriculture of New Zealand are copyright. Proprietors of newspapers and periodicals wishing to republish matter are at liberty to do so, **provided both the "Journal" and author are acknowledged.**

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture," Box 3004, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

BLUFF IN SOUTHLAND



The most southerly borough in New Zealand, Bluff is the port for the rich agricultural and pastoral district of Southland and can accommodate ships of 20,000 tons. In addition to a freezing works and rabbit canneries, there are dairy produce and cool stores and wool and grain stores in the town and a fleet of 10 oyster trawlers operates from the port.

[V. O. Browne photo.

Livestock Imports and Exports Back to Pre-war Levels

IMPORTS and exports of livestock for breeding purposes are rapidly passing pre-war levels and there is no doubt whatever that this demonstrates a very healthy state of affairs in the Dominion's herds and flocks. Not only does it show that our farmers are determined to maintain and improve the quality of their stock, but also that present standards are high and New Zealand breeds are much sought after by producers and breeders the world over.

Although our export trade in livestock is largely concerned with Australia and South America, I notice that over the past 12 months stock has been exported to Canada, Iran, Fiji, East Africa, Singapore, Tonga, Papeete, and Nauru, and I feel sure that only the excellent quality of New Zealand stock is responsible for the very wide interest shown abroad.

During the war shortages of shipping space hampered the development of the export trade in New Zealand livestock as well as the plans of the Dominion's breeders wishing to introduce new blood into their herds and flocks. The acquisition of the Motuihe Island Quarantine Station by the Navy made importing even more difficult, particularly for Auckland and the northern districts. Now that the new station at Motutapu Island, in the Hauraki Gulf, is operating, the quarantine problem is no longer a serious one. With this station and that on Somes Island in Wellington all imports of livestock can now be more conveniently and easily handled.

One of the most interesting features of the cattle importations is the introduction of the Galloway breed; four bulls and 43 heifers arrived in the Dominion last year. This breed, which thrives in the Highlands of Scotland, has the reputation of being a great beef producer and has won some of the highest awards at Smithfield Market in London. It is hoped that Galloways will prove useful in the redevelopment of our own high country in the same way as the Polled Angus have done in the past.

Further drafts of Cheviot sheep, also from the Scottish Highlands, have recently arrived and their progress on hill country will be watched with great interest. We are still relying on Australia for renewals of Merino strains and nearly 400 were brought into the Dominion last year. Now that the war is over, South America is again becoming one of our most important markets for pedigree livestock and over the past 12 months more than 200 sheep, mainly Corriedale and Romney Marsh, were shipped there. I feel that not nearly enough credit or recognition has been given to New Zealand for the Corriedale strain. New Zealanders are apt to forget that this breed was developed in their own country within the relatively short history of the Dominion. Even before the Second World War there was a wide demand for Corriedales from South America, Australia, Japan, and other countries.

Mr. James Little, to whom the biggest share of the credit for Corriedales should go, died in 1921 and the continued demand for them from overseas is the best recognition of his ability and confidence that he would have wanted.

An interesting and significant development in our export of livestock is the growing demand from Australia for pedigree dairy cattle. A number of Friesians have already been shipped across the Tasman and a marked interest continues to be shown in other breeds. This too, I feel, is a great compliment to the splendid research, experimental, and testing work which has been carried on in this country, not only by the Department of Agriculture, but by the farmers themselves, their organisations, and the breed associations.

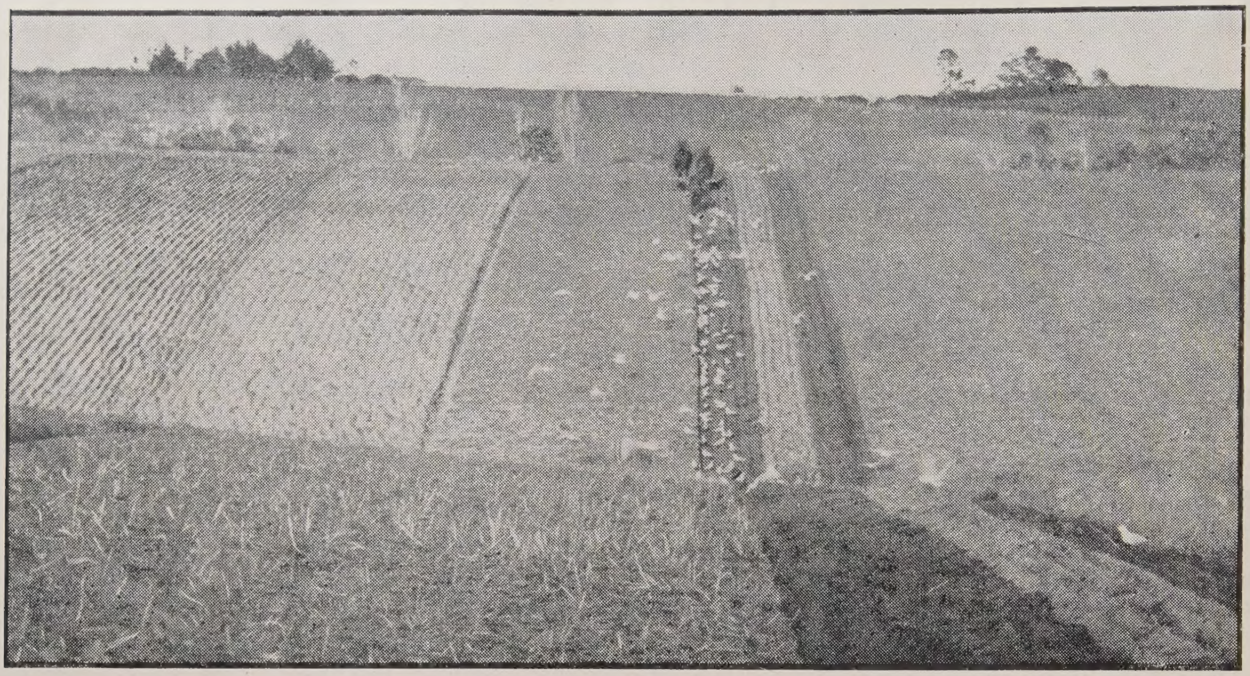
Another export of increasing importance is that of thoroughbred stock. Many of us like to believe, and not without some justification, that our racehorses are in world class, and the fact that Australian buyers are bidding keenly for our yearlings and bloodstock certainly indicates the quality of our thoroughbreds. In 1947 nearly £100,000 was earned from this export trade alone and this figure is believed to have been exceeded in 1948.

In just over a hundred years New Zealand breeders have come a long way indeed. The pioneers, with little experience to guide them in this new land, under conditions often quite foreign to the stock which they brought with them, laid the foundations for today when New Zealand breeds can well match those in other lands. The full cycle has turned; after having to import every head of stock from abroad, after experimenting tirelessly, continuously seeking the ideal, never satisfied with the "fairly good," New Zealand breeders have now become exporters of high-quality stock.

The export of livestock is now an important currency earner for the Dominion. Not only does it evidence a more than creditable past performance, but it also augurs well for the future.

EDWARD CULLEN, Minister of Agriculture.

PLOUGHING GRASS FOR ROOT & GREEN FORAGE CROPS



SEASONAL NOTES Contributed by the EXTENSION DIVISION

LATE and tardy preparation of land for root and green forage crops to be sown in spring or early summer is often deplored by agricultural advisers. The time for ploughing and the method of working down are, however, decisions to be made in the light of local study and experience, for it is possible under certain conditions for late ploughing to give better results than early ploughing.

FOR instance, root-growing competitions on the pumice soils of the central area of the North Island showed that the majority of competitors securing good crops ploughed about a month before sowing. Although these soils are light, they hold moisture well and the area has an annual rainfall of about 50in.

Pastures on many of the light soils of the Waikato contain redtop in a suppressed state, which, if the land is ploughed in winter, may increase tremendously during wet weather in late winter and early spring, giving a solid mass of twitch which is extremely difficult to work out. If, however, the land is not ploughed until late October or early November, the twitch may be suppressed by cultivation and is not a hindrance to the root or forage crop sown.

General advice, then, on the cultivation of land for root and forage crops should be considered in relation to the condition of the particular field. The chief factors to consider are the soil, the rainfall, and whether the land contains twitch or other weeds which may require particular methods for their suppression.

Cultivation of Loams

Light soils generally require a shorter fallow than heavy soils, and while a month may suffice between ploughing and sowing light, sandy soils in high-rainfall districts, loams of medium textures generally require a longer fallow. Farmers usually deep plough the land in August, giving at least 2 months for cultivation before sowing. If possible, the grass turf should be hustled, disced, or skimmed before deep ploughing. Skim ploughing should take place at least 6 weeks before deep ploughing to permit the decay of the turf, which should be thoroughly disced before deep ploughing. The land will not then require much further preparation before sowing, which could take place within a month.

Not much time is lost and frequently time is gained through preliminary working of the surface of the ground. Air is necessary for decay to take place. Hence the difficulty always experienced wherever top working of the grass turf is not carried out, particularly on soils of heavy texture.

Working of Heavy Soils

On heavy soils ploughing often cannot be carried out in July, August, and September because of the waterlogged condition of the soil. If ploughing is delayed until spring, there is often insufficient time left for the preparation of the ground, which is itself difficult.

Ploughing should first take place in autumn or early winter, the skim ploughing when autumn rains have softened the ground and the deep ploughing before winter rains have made it too wet.

If the ground is left to lie over the winter, frosts will pulverise the soil and make preparation of the soil in spring easy.

In mild climates without the assistance of frosts it will usually be necessary to surface work the land when it is dry enough to carry implements and tractors or horses, followed by another ploughing before final working down for the seed-bed.

The working of heavy land should always be timely. Clay does not break down when it is wet or when it is dry, but in a stage between. If the stage is judged correctly, the work is fairly easy; if not, little progress is made.

Frequently it pays on heavy soils to disc ploughed land a few hours after ploughing, even though this upsets the working programme.

Early ploughing is therefore an advantage on such soils, as it gives the farmer time to choose periods of working which are suitable for the breaking-down process. Early ploughing also exposes the soil to frost, which makes short work of the large lumps.

Heavy soils can be made to grow good root crops, and the failures frequently seen are due mainly to untimely cultivation.

Home Garden Sowing of Little Gain in June

By A. G. KENNELLY, Vegetable
Instructor, Department of Agriculture,
Christchurch.

EXCEPT in favourable situations where drainage and soil conditions are good, little is to be gained by sowing even hardy vegetables in the open ground in June. Broad beans and even spinach can be sown where drainage is good, though the sowing of most other hardy vegetables such as peas, carrots, turnips, lettuce, and silver beet is better delayed in most open situations at least until July; in some districts delay until August or even September may be advisable.

THE well-planned home garden shows to advantage in June. Though the kinds of vegetable available may vary from district to district, most of the following should be ready for harvesting during the month: Root crops in variety, winter cauliflower, savoy or winter cabbage, curly kale, brussels sprouts, celery, silver beet, spinach, winter rhubarb, leeks, and lettuce.

Every opportunity should be taken now to clean up and dig over ground from which crops have been harvested, because if the work is left for the future, the weather may make it more difficult. Soil turned over now will benefit from exposure to the weather and should be more fertile than if left to be dug just before sowing or planting.

Asparagus tops should be cut down if the work has not already been done, and the bed mulched with compost or a light dressing of farmyard manure and soil. The compost heap can be turned or remade if required. In well-drained soil spring cabbage and, in sheltered situations or in districts where winters are not too severe, cauliflower can be set out. Celery and leeks should receive their final earthing up if the work has not yet been finished, and the digging of potatoes should be completed without delay. The curds of winter cauliflower should be protected by bending over the encircling leaves if weather is likely to injure them.

Vacant land should be sown with a green or cover crop, and land on which a green crop is growing and which is required shortly for cropping should be dug over without delay to enable rotting to proceed. Liming may be advisable first, and generally June and July are most suitable for applying lime, as in many gardens a considerable area is then bare of crops and the winter rains can be relied on to wash the lime down through the soil.

[*Sparrow Industrial Pictures Ltd. photo.*

Ground from which crops have been harvested should be cleaned up and dug over now so that the soil will benefit from exposure to the weather.

Asparagus

The fronds of asparagus should now be cut down close to the ground. They can be cut with a knife or secateurs, or if the stems have not hardened too much, with heavy shears. It is a good plan after cutting to leave the top growth on the bed until it is properly dry and then to burn it there. Most of the minerals it contained and which were taken from the soil can thus be returned if the ashes are scattered or raked evenly over the bed. Burning will also destroy the ripened seed. Afterward the bed should be weeded and can be lightly forked over.

Broad Beans

Broad beans can still be sown in well-drained soil as advised in last month's "Journal." Broad beans are particularly hardy and are usually harvested at a time when in most gardens vegetables are scarce and lacking in variety. The long-pod varieties are usually earlier, though the broad-podded or Windsor types are usually considered of better quality.

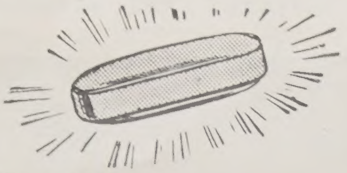
Cabbage and Cauliflower

Seed of cabbage and cauliflower for successional planting can be sown now. The round, smooth-leafed type of cabbage Golden Acre is excellent. In good conditions it is quick maturing and tender and in addition does not grow too large. Varieties of cauliflower such as Early London, Walcheren, and All Seasons are suitable for sowing now in most districts for planting out in early spring.

Except in a few especially-favoured districts, seed should be sown in a sheltered, prepared bed with a favourable aspect or in a frame or cool, open glasshouse. If the seed is sown in boxes, the boxes should be deep enough to provide ample root room. Thinning may be advisable later.

The seed-bed for cabbage and cauliflower should be deeply and thoroughly cultivated and the soil enriched with compost or other well-rotted material. Lime should be applied to most soils not recently dressed; 2 to 4oz. per square yard annually is usually sufficient. Seed can be sown broadcast in beds, but for convenience of weeding and for ease of lifting is usually best sown in rows about 12in. apart. In heavy soil seed should not be sown more than ¼in. deep.

Cabbage plants of the pointed type for spring use can still be set out in most districts as advised in the March issue of the "Journal." In districts having a mild, rather warm winter, however, smooth-leafed round cabbage is often preferred, as it is considered that the hardier pointed types of cabbage tend to grow too rankly under warm conditions. Cauliflower can also be set out where the situation is not too exposed and winter conditions are not too severe. Hardy varieties such as Walcheren and All Seasons should be chosen in the colder districts.



AT LAST . . .

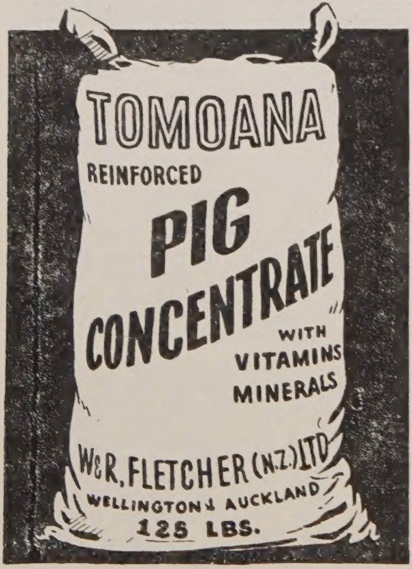
DRY DRENCHING!
with "PHENOVIS"

5 Gramme PHENOTHIAZINE PELLETS

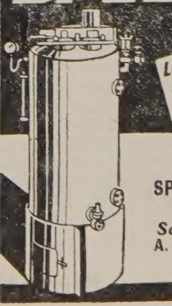
"Phenovis" 5 gramme pellets bring a host of advantages to the sheep farmer. They permit no staining during drenching . . . they are easy to handle and administer. "Phenovis" also eliminates guesswork, as each pellet contains accurate doses of Phenothiazine.

Full particulars of "Phenovis" dry drenching will be supplied free of charge on application to:

N.Z. DISTRIBUTORS:
SUMMIT
PRODUCTS LTD.
P.O. Box 328, Palmerston North.



SPEEDWAY



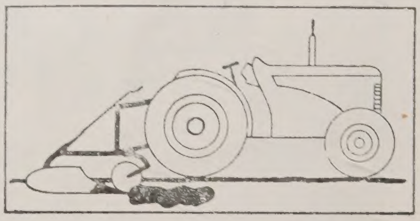
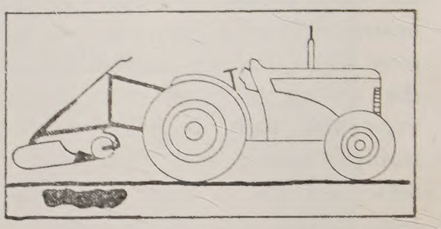
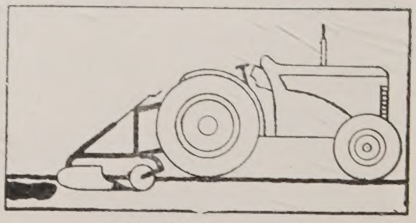
LOW & HIGH PRESSURE
OIL BURNING
BOILERS

Write for free illustrated catalogue to
SPEEDWAY PRODUCTS LTD.
26 Albert St., Auckland
South Island Distributor:
A. H. TURNBULL & CO. LTD.,
Christchurch

SB-1-2

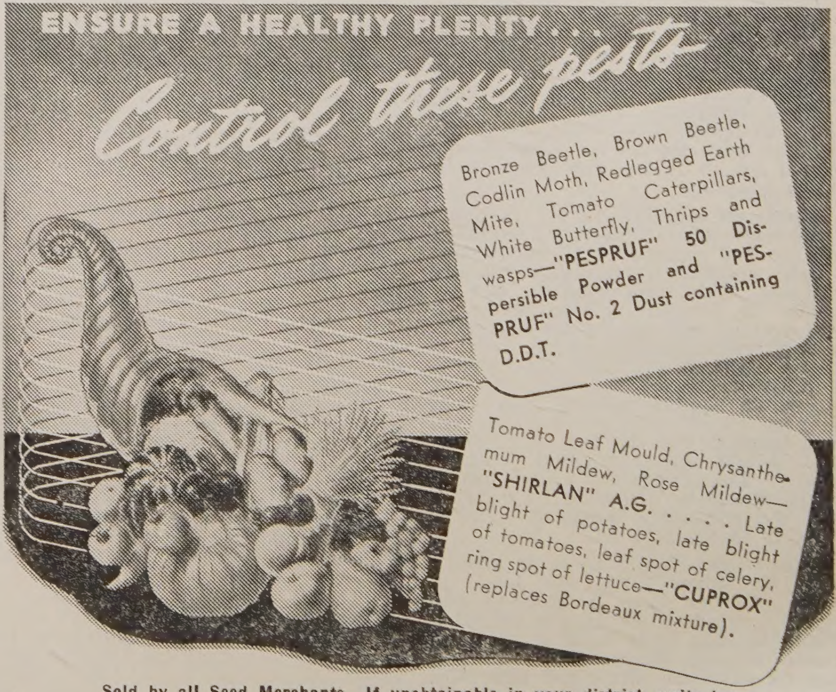
Hidden obstructions can't harm the

DAVID BROWN

N.Z. Distributors:
TODD BROS. LTD., Wellington.
Dealers Everywhere.

The spring controlled overload release attachment in the David Brown linkage automatically releases the tractor clutch when an obstruction is met—a much more positive and certain safety device than other systems. Sketches show the sequence: Implement meets obstacle. Immediately overload release stops tractor. Operator touches power lift control, raises implement from ground, drives forward lowers implement. No delay, no damage.



ENSURE A HEALTHY PLENTY . . .

Control these pests

Bronze Beetle, Brown Beetle, Codlin Moth, Redlegged Earth Mite, Tomato Caterpillars, White Butterfly, Thrips and wasps—"PESPRUF" 50 Dispersible Powder and "PESPRUF" No. 2 Dust containing D.D.T.

Tomato Leaf Mould, Chrysanthemum Mildew, Rose Mildew—"SHIRLAN" A.G. . . . Late blight of potatoes, late blight of tomatoes, leaf spot of celery, ring spot of lettuce—"CUPROX" (replaces Bordeaux mixture).

Sold by all Seed Merchants. If unobtainable in your district, write to:
IMPERIAL CHEMICAL INDUSTRIES (N.Z.) LTD.
P.O. Box 990, Wellington. P.O. Box 900, Auckland.

AGRICULTURAL ICI CHEMICALS

Horse-radish

The value of horse-radish as a relish makes it well worth growing where space permits. Botanically known as *Cochlearia armoracia*, it belongs to the same natural order (*Cruciferae*) as cabbage. The flavour of the root is very hot, and though it is used less now than formerly, it makes a welcome addition to a number of dishes if it is properly prepared. It is excellent scraped and grated into fine particles and made into a sauce for roast beef and certain kinds of fish. Occasionally it is pickled and used in salads with mayonnaise.

Horse-radish is propagated by crowns or root cuttings usually about 6in. long, though results are usually better if cuttings are longer; very good results are usually obtained from cuttings 12 to 14in. long. They should be about the thickness of the little finger and not thinner than a lead pencil. After side shoots and rootlets have been removed they should be planted in a prepared bed that has been deeply dug and well manured.

The easiest way to plant them is by making holes a little longer than the prepared cutting by pushing a stick into the soil so that holes are made about 1ft. apart and fairly near the horizontal. They should be long enough to accommodate the cuttings, but not more than 3 to 4in. from the surface at the deepest part. The cuttings can then be inserted small end downward. There is no need to press the soil about them. Half a dozen roots are sufficient for the average family.

Roots can be planted in June, but July or August is preferable in the colder districts. In good soil roots should grow to about 6 to 8in. in circumference in about 8 or 9 months. Though horse-radish is a perennial, it is best treated as an annual, because if it is left for several years, it usually tends to encroach on nearby crops. Plants grown for 2 years produce a larger yield, but the roots are usually woody.

[*Green and Hahn Ltd. photo.*

Horse-radish is not a common vegetable in New Zealand, but it is easy to grow and well worth a trial by those who like its pungent flavour. It should be replanted each year; otherwise it becomes rather coarse and tends to spread.

[*Green and Hahn Ltd. photo.*

The seed-bed for cabbage and cauliflower requires special preparation. The soil should be well drained and the bed in a sunny situation. Spraying with Bordeaux mixture may be necessary where mildew is troublesome.

Lettuce

Lettuce for spring cutting may be sown now even in the colder districts if shelter is given. The limited number of plants required for the average home garden can be raised in a box which should be placed in a sunny, sheltered situation. The preferred time of sowing varies greatly in different districts and situations. The first sowing for spring cutting may be made as early as February in some southern districts, but as good quality in lettuce is greatly dependent on reasonably quick growth and the optimum period for most varieties of lettuce to mature is about 12 to 14 weeks, it is usually better to sow later under conditions made favourable by artificial means; for example, in a wooden-sided frame covered against frost with scrim or glass and situated where it is exposed to a maximum of sunshine.

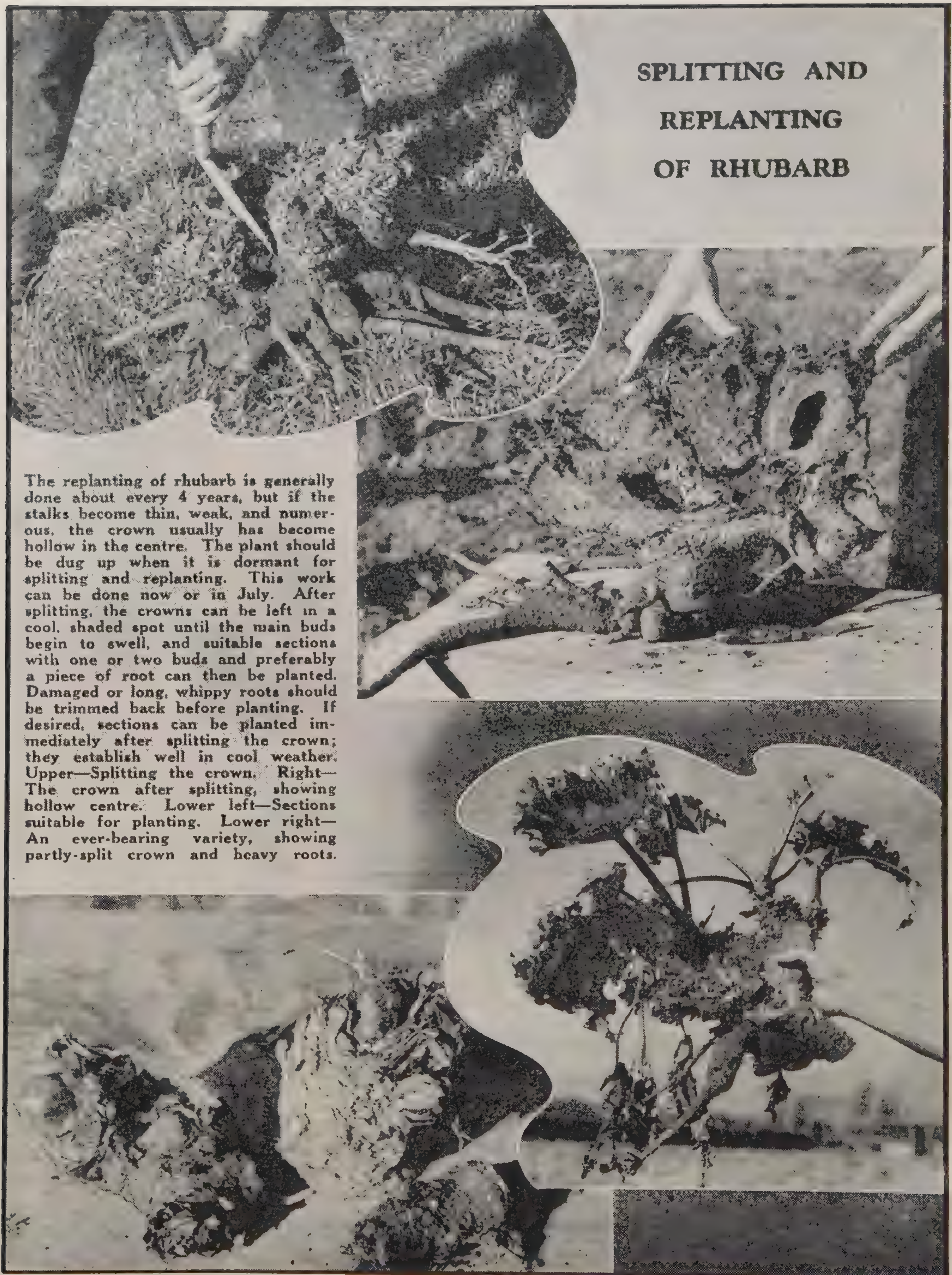
Successional sowings are usual, but as the seed is small and germination relatively weak, the soil should be finely cultivated and well drained. It should contain adequate well-rotted organic manure or compost. Seed can be sown thinly in rows or broadcast thinly ¼in. deep in boxes. Diseases such as mildew and ring spot are often troublesome on lettuce at this time of year. Both can be controlled if noticed early.

Ring spot, sometimes called "rust" by southern growers, first appears on the main rib of the oldest leaves near ground level as slightly-sunken, pale-yellow spots which later turn brown and spread, often causing small splits. The disease is usually spread to the leaves by splashes from raindrops and appears on them as small brown spots which may coalesce, leaving irregular patches of dead tissue, which may fall away and give a "shot hole" appearance.

The disease spreads rapidly in the seed-bed and may cause the death of whole groups of plants. Plants set out may be killed, but usually remain stunted. Ring spot can be controlled by spraying with Bordeaux or suitable Government certified fungicide at intervals of about 10 to 14 days in the seed-bed and 3 to 4 weeks in the field. Overcrowding should also be avoided and rotation practised.

Downy mildew is most damaging in the seed-bed, causing stunting and sometimes wilting of the plants. White, downy patches appear on the undersides of the leaves and yellow spots on the upper surface, which later turns brown. The damage predisposes plants to secondary decay. It can be

SPLITTING AND REPLANTING OF RHUBARB



The replanting of rhubarb is generally done about every 4 years, but if the stalks become thin, weak, and numerous, the crown usually has become hollow in the centre. The plant should be dug up when it is dormant for splitting and replanting. This work can be done now or in July. After splitting, the crowns can be left in a cool, shaded spot until the main buds begin to swell, and suitable sections with one or two buds and preferably a piece of root can then be planted. Damaged or long, whippy roots should be trimmed back before planting. If desired, sections can be planted immediately after splitting the crown; they establish well in cool weather. Upper—Splitting the crown. Right—The crown after splitting, showing hollow centre. Lower left—Sections suitable for planting. Lower right—An ever-bearing variety, showing partly-split crown and heavy roots.

[Green and Hahn Ltd. photos.

controlled by rotation and the use of Bordeaux from the seedling stage.

Pop Corn

The only type of corn likely to be in store in most home gardens now is pop corn. Though pop corn has been grown in America for at least as long as records show, it is only in recent years that it has been commonly grown in New Zealand. Its culture is similar to that of ordinary sweet corn, but as it has a vitreous seed-coat that is not easily damaged if the weather becomes cold and wet, it may be sown when the sowing of sweet corn would have to be delayed.

A number of theories have been advanced to explain why pop corn pops. It was thought for a time that the outer layers of the kernel acted as retaining walls until pressure built up, but this theory was abandoned when it was found that if the seed-coat was entirely removed, the corn would still pop and that just a part of the kernel would pop as well as the whole kernel. The oil in the seed was also thought to be the expansive force, but as the corn pops if the germ is removed, it is now considered that the moisture content in the tiny cells of starch is the force which when changed into steam is responsible for the explosion in the kernel.

Pop corn differs from other types of corn such as sweet corn and the starchy types of maize in its flinty texture. The starchy maize contains practically no flinty material around the starch grains and consequently it is almost impossible for it to pop, but the spaces surrounding the starch grains in pop corn are all filled with flinty-textured material, which retains pressure until sufficient has been built up to explode the whole.

Harvesting pop corn at the correct period has an important bearing on its use for popping. The cobs must mature properly before harvesting, as immaturely-harvested cobs rarely pop well. Starchy or imperfectly-developed cobs should not be kept for popping. Pop corn should not be stored in too dry an atmosphere, as it is important that its moisture content does not fall below 12 to 13 per cent., which are considered the most satisfactory percentages of moisture for popping. Maximum popping should then be obtained if 175 to 200 degrees C. is reached in from 2 to 3 minutes of the first application of heat.

Most New Zealand seed catalogues listing pop corn do not give varieties, but overseas catalogues usually list varieties according to type and earliness.

Because of the unfamiliarity of New Zealand home gardeners with pop corn there seems to be a fairly general lack of knowledge of preparing it. It can be popped in a shallow metal dish or big frying pan.

One method is to melt 2 tablespoons of shortening or butter or heat 2 tablespoons of cooking oil in the pan. When it is hot about ½ cup of pop corn is added and the whole is covered with a lid and shaken over the heat until all the corn is popped. One cup of corn makes about 5 cups of pop corn, so too much corn should not be heated at once. Popped corn can be eaten either as it is or made up into a number of attractive sweets or candies.

[Green and Hahn Ltd. photo.

Potatoes for planting later in the year can be selected now and placed in boxes with the eyes up to sprout. They should be stored in a light, airy, frost-free shed or outbuilding and must be protected against excessively-low temperatures.

Potatoes

June is rather early for most home gardeners to plant potatoes or to prepare them for planting, but in well-situated gardens in favourable localities, or even in some of the less-favoured localities where the home gardener is prepared to keep all new growth earthed up until danger of frost is over, seed potatoes may be planted or selected and placed with the eyes up to sprout and green in a light, airy, frost-free shed or outbuilding.

Where the tuber-moth is troublesome the tubers, particularly the eyes or any scar or clearly-marked depression on them, should be dusted with D.D.T., arsenate of lead powder, or hydrated lime. Potatoes stored in sheds or outbuildings in districts subject to heavy frost should be protected from excessively-low temperatures. If the building is open, or if there are cracks in the walls so that air at freezing temperatures is enabled to enter and freeze the tubers, the yield may be significantly reduced.

Radish

In favourable localities radish can be sown all the year round, but in most southern districts soil temperatures are generally too low for sowing now. In sunny, sheltered situations, however, the soil temperatures can usually be raised by making a raised bed or ridging the soil. A raised bed is usually preferable for radish, as the seed can be broadcast where the soil is free from weed seed. Most of the popular varieties mature fairly quickly and can be harvested from the time they are half-grown. The bed should not be more than about 4ft. wide and should be accessible from both sides without the need to stand on it. Comparatively-narrow beds are preferable. The soil should be well drained, the top 6in. cultivated to a fine tilth, and then gently firmed. The soil should be moist and very rich in fine, well-rotted organic matter; compost is excellent. The seed should be sown thinly ¼in. deep, and if in rows, 12 to 15 to 1ft. Except where the very large Chinese varieties are grown, rows need be only about 6 to 8in. apart. Though long varieties are generally grown for winter use, they are usually sown early enough in autumn to make most of their growth then. For sowing now an oval or turnip-shaped variety such as French Breakfast or Round Black Spanish is usually preferable, because maturity is quicker.

Rhubarb

Rhubarb should be grown in the garden of every home where its flavour is appreciated. Though the leaves contain poisonous substances, the stalks are a good source of vitamins and are a health-giving food. Six or 8 plants will provide ample stalks for the average family. Rhubarb is very easy to grow, as it is a strong, vigorous-growing plant that will stand setbacks. Only good strains should be grown, as there is a great difference in quality and yield between good strains and poor ones. Strains of rhubarb suited to early main crop or winter production are available.

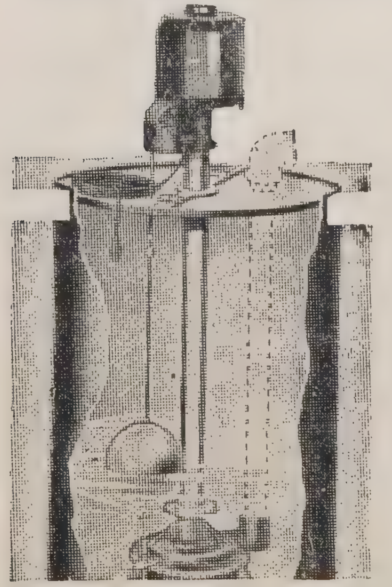
Though the replanting of rhubarb is usually done about every 4 years, variety, soil, and situation all play a part and in some instances beds will continue to produce good stalks for up to 10 years or more. Crowns can be lifted now or during July and laid aside to await the development of buds if division and replanting are deemed necessary. Even the ever-bearing or winter varieties suffer lifting less severely during the period

Down Comes the Rain!
DOWN GOES
Flood Water

into Basements, etc.—
Remove it with this

CELLAR DRAINER

- Can be adapted for varying sump depths.
- A centrifugal-action pump made of bronze, with steel shaft and copper float.
- Automatically pumps out water from CELLARS, BASEMENTS, SUMPS, BOILER ROOMS—Protects the foundations from water seepage.
- High efficiency and dependable performance.



BROWN BROS.' CELLAR DRAINER DRAINS WHEN IT RAINS!

Please Write or Call for Full Details of How the Cellar Drainer can be Adapted to Your Requirements.

BROWN BROS
ENGINEERS LTD.
PUMPING MACHINERY SPECIALISTS

590 COLOMBO STREET,
P.O. Box 548J, CHRISTCHURCH.

Introducing ... The NEW MASSEY-HARRIS 6 CYLINDER FULL DIESEL TRACTOR the 744 PD.

TACKLES THE HEAVIEST WORK WITH EASE!

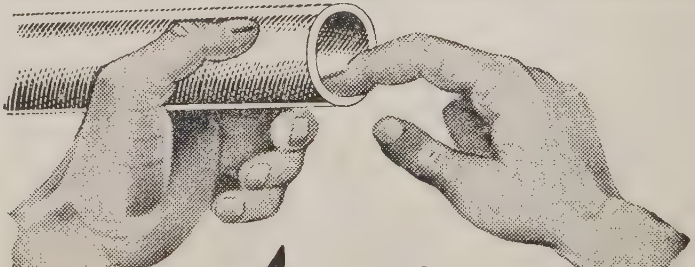
The Latest Addition to the "Make it a Massey-Harris" Range of Power Farm Equipment.

- Equipped with **PERKINS P.6 DIESEL**—6 cylinders—42 B.H.P. for steady, powerful performance.
- **SPEEDS** m.p.h. m.p.h. m.p.h.
  High: - 12 3rd: 4.35 Reverse: 2.85
  2nd: - 3.28 4th: 5.65 Low: - 2.19
- **WHEELBASE:** 83 inches.
- **EQUIPMENT:** Belt Pulley, draw-bar, self-starter, instrument panel, fenders, brakes, lights and wheel-weights.

Get the full facts—write NOW for fullest details.

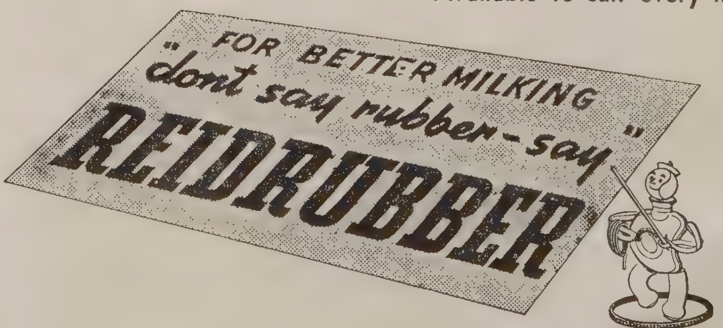
MASSEY-HARRIS CO. LTD.
IN ASSOCIATION WITH P. & D. DUNCAN LTD.

Head Office: CHRISTCHURCH. Branches: AUCKLAND, PALMERSTON NORTH, and DUNEDIN.



YOU CAN *feel* THE DIFFERENCE

Smooth bore ensures thorough cleaning.
Special rubber formula is resistant to milkfats.
Available to suit every milker.



Reid New Zealand Rubber Mills Ltd. - Great South Road, Auckland

feed **HOGGETS**
TOMOANA SHEEP NUTS

of slow growth in late autumn or winter, though they are best replanted without delay after splitting up. Dormant rhubarb crowns are very hardy and after lifting may be left in a cool, shaded spot until new buds commence to swell and can be distinguished easily. Suitable sections each with one or at most two buds and preferably a piece of root can then be replanted. Planting can be done now if desired, as dormant buds can usually be distinguished without difficulty if the adhering soil and dead vegetable matter are removed.

When the crowns are replanted they should be covered with soil to a depth of about 1 or 2in. and set out 24 to 30in. apart in rows 30 to 36in. apart according to the size and vigour of the variety. The soil should be rich in such organic matter as stable, farmyard, or poultry manure, compost, or well-rotted stack bottom. Where strong crowns have been planted in well-drained soil manuring is unlikely to be excessive in most home gardens, as rhubarb is a rank-growing plant and responds especially well to a rich soil. If natural organic manure is not available, an artificial fertiliser such as blood and bone mixed into the soil around the crown usually gives good results in soils that are otherwise in fairly good condition. Blood and bone is used to a great extent by commercial growers who have difficulty in obtaining material such as fowl manure, which is in keen demand because it is rich in plant nutrients and is a good source of organic matter, yet less bulky and so easier to handle than farmyard manure.

Good drainage is very important, and the site of a new rhubarb bed should be trenched or deeply dug and perennial weeds such as oxalis, couch grass, or convolvulus removed. If necessary, the area should be drained by field pipes or the deep burial of open, stony material to form a moraine drain. The bed should not be overshadowed by trees.

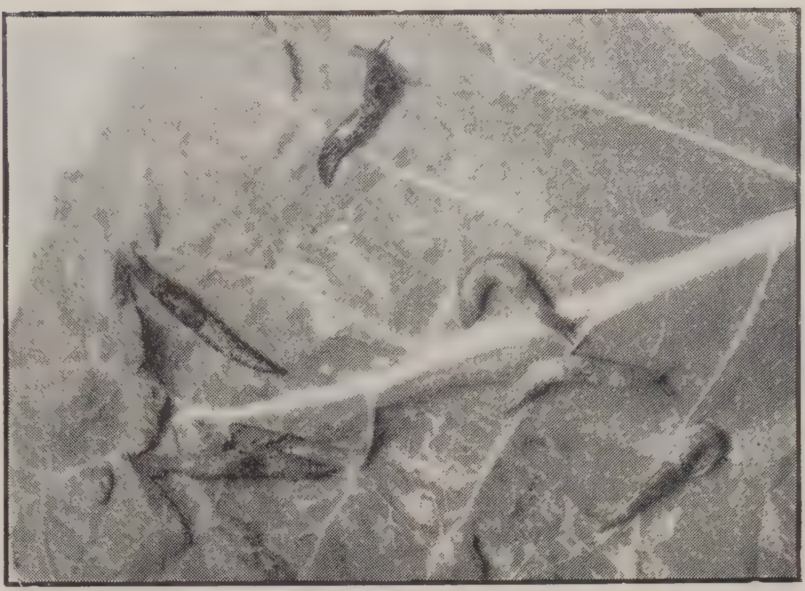
Tomatoes

Tomato plants can now be pulled up and put on the compost heap. They should be chopped up first. This can usually be done with a spade, though where stem-borer caterpillars have been troublesome and the chrysalids of the looper caterpillar are present the stems are best burnt. However, if compostible material is available for making the compost heap into a very efficient one where the heat rises rapidly and remains for a time at a high enough temperature to kill the pests, the plants can be composted. Nearly-mature fruit that is not yet coloured should be stored as advised in the March "Journal."

Slugs and Snails

The dampness of the ground, which is usual in late autumn and winter, suits creatures such as slugs and snails. They are usually very damaging to cabbage, cauliflower, lettuce, and to seedlings. There are several species of slugs and snails, though slugs are more common than snails and are present in practically all home gardens.

Slugs and snails feed at night or early in the morning. Moisture is necessary to them and they shun the daylight and dry air. They shelter during the day in any place that is cool, dark, and moist. Their habit of excreting a slime which assists them in crawling and also enables them to get rid of any irritating substance with which they may come in contact and their nocturnal habits make them very difficult to control. Different species differ somewhat in their eating habits. Some feed mainly on stems and leaves well above ground and others feed chiefly at ground level or tunnel into the bases of plants, roots, or tubers well below ground level. They are voracious feeders and have biting mouth parts with which they eat holes in plant tissue or eat the edges of it. The eggs of most species are easily recognised. They are rounded, jelly-like, and translucent.



[*Green and Hahn Ltd. photo.*

The damp conditions of late autumn and winter suit slugs and snails and when they are sufficiently numerous they can do great damage in the garden. They can be controlled by one of the methods described in this article.

Slugs and snails can be controlled in a number of ways. Clean cultivation is, of course, essential as the first step. When there are only a few plants or small areas affected their numbers can be greatly reduced by going out at night with a torch and scissors and snipping all those seen or by laying out boards, tiles, cabbage leaves, or cut potatoes and examining them at intervals and killing with hot water the slugs and snails found on them. A moistened mixture of 1 part of calcium arsenate and 16 parts of bran (both by weight) is very effective against snails, but it is not generally recommended, as it tends to burn foliage, and as it is a deadly poison, great care must be taken, particularly when there are children about.

The most effective poison against slugs and a very effective one for snails is metaldehyde. It can be made up by mixing 1oz. of metaldehyde to 3lb. of bran. The mixture may be used dry or slightly damp, but not so damp that the flakes stick together. The metaldehyde must be finely ground and thoroughly mixed. Other feeding stuffs or even tea leaves may be substituted if bran cannot be obtained. The bait can be broadcast thinly or scattered in very small heaps about 12in. apart; if these heaps are covered with such material as pieces of wood, the bait will be protected from birds and will remain effective for several weeks. Sticks of metaldehyde should be kept out of the reach of children, because it is injurious to health. The bait should be applied on a mild evening when the soil is moist; dry or frosty conditions are unsuitable. Other controls are hydrated lime or a mixture of 1 part of dehydrated copper sulphate (bluestone) and 9 parts of hydrated lime (both by weight); this mixture should be dusted over the ground in the evening.

To dehydrate the bluestone first grind it to a powder. Heat the required amount in a tin until the material becomes a powder that is almost white, then mix in the dehydrated lime, and dust the mixture over the required area. A simpler but somewhat less effective measure is to powder some bluestone and mix with it an equal weight of hydrated lime; this mixture should be broadcast at the rate of 1lb. per 10 sq. yds.

In the control of slugs and snails it is important to destroy the hiding places of the pests, such as heaps of rubbish, long grass, and weeds.

Garden Improvements

During winter, when the work of planting, sowing, and cultivating crops is greatly reduced, it is usually a good plan to attend to such jobs as the building of garden equipment or furniture or the improvement of garden amenities. Garden seats, bowers, trellises, and fences can be made or repaired. For those who do not already possess one a frame or compost box will be found a welcome acquisition.

DESIGNS FOR PERMANENT GARDEN PATHS

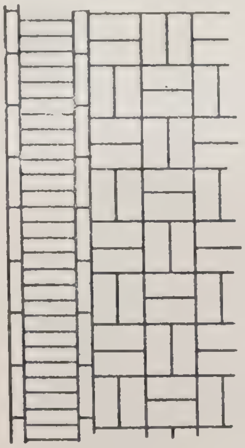


Fig. 1

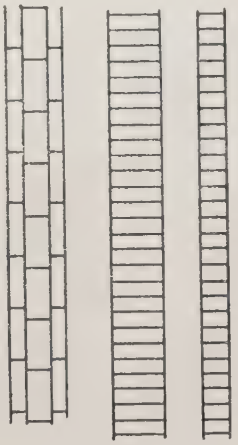


Fig. 1A

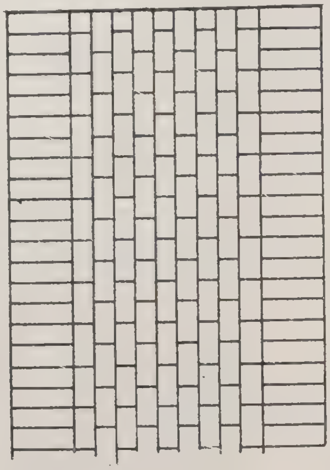


Fig. 2

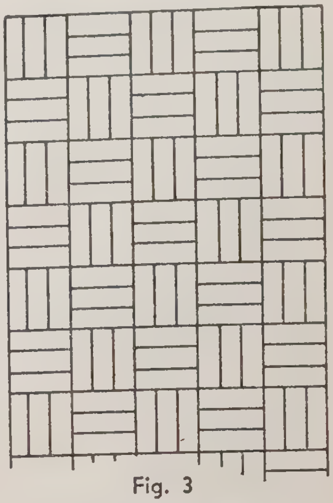


Fig. 3

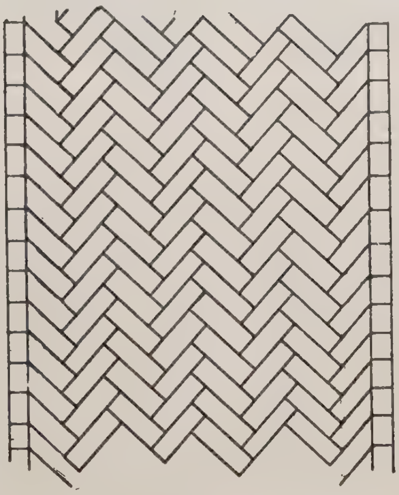


Fig. 4

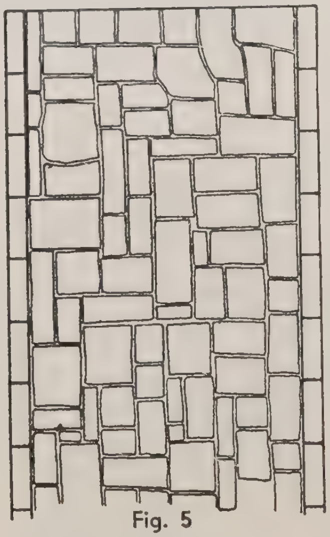


Fig. 5

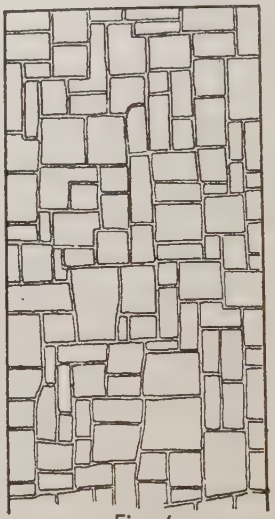


Fig. 6

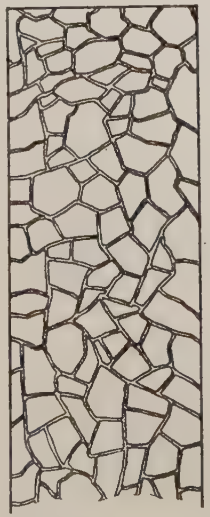


Fig. 7

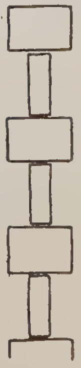


Fig. 8

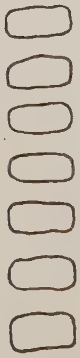


Fig. 9

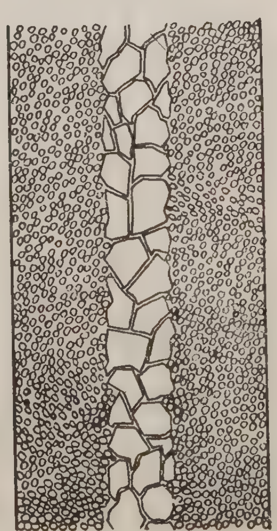


Fig. 10

Fig. 1—Brick path made in a square pattern with edging.

Fig. 1A—Types of edgings for brick paths. The two on the left are especially suitable for wide paths.

Fig. 2—Brick path of longitudinal pattern.

Fig. 3—Brick path of basket-weave pattern.

Fig. 4—Brick path of herring-bone or diagonal pattern.

Fig. 5—Random paving with formal edge.

Fig. 6—Random paving.

Fig. 7—Crazy paving.

Fig. 8—Paving slabs with connecting slabs.

Fig. 9—Paving slabs. Each slab should not be less than about 10in. wide or more than about 18in. wide.

Fig. 10—Cobble and stones or slabs.

Garden Paths

June is a good time to repair paths or drains. Temporary paths beaten across the soil can be forked up and the soil left so that it can be broken down by the weather, and permanent paths can be laid down. Usually paths made of hard-wearing material such as brick, stone, concrete, or even macadam are preferable to grass, which readily suffers damage in winter, when growth is slow, conditions are wet, and traffic is heavy, and in summer may dry out or require frequent cutting to prevent seed from developing and falling on the garden.

Brick Paths

Bricks are suitable for straight paths, but are difficult to embody in curved paths. Brick paths, different types of which are shown in Figs. 1 to 4 on the opposite page, are usually laid without cement or mortar. The bricks are simply packed tightly together and are held by outside pressure on the edges of the path. A firm foundation is essential to prevent them from shifting and it is usually advisable to have the surface of the path several inches below that of the surrounding ground. The earth along the edges should be packed tightly to hold the mass of the bricks in place. Alternatively an edge can be built by cementing the edging bricks together. Edging bricks can be held very securely by pressure of earth if they are embedded deeply on their edges as shown in Fig. 11. The bricks will also be held securely if edged with specially-placed bricks (Fig. 1A) or with a brick, stone, or concrete wall (Fig. 12).

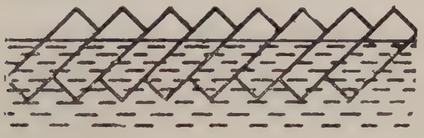


Fig. 11—An edging of bricks embedded on their edges.

The approximate number of bricks to lay down on a given area of path can be calculated (assuming bricks 9in. x 4½in. x 3in. are used) on the basis that for each square yard of path about 32 to 34 bricks laid flat (that is, 9in. x 4½in.) will be required; 48 to 52 will be required if the bricks are laid on edge (that is, 9in. x 3in.).

Crazy and Random Paving

For crazy paving, random paving, and random paving with a formal edge (illustrated in Figs. 5 to 7 on the opposite page) stones with flattened surfaces can be used, but cement slabs are preferable. Unless they are deeply embedded, they should be cemented together at the edges. If cemented, however, it is a good plan to leave gaps in the interstices so that dwarf alpines or similar dwarf plants can be planted. (A list of plants suitable for this purpose is set out at the end of this article.) Gaps will also facilitate drainage, as it is not usual to build this type of path with a camber unless it is wide enough for wheeled vehicles such as motor cars, though that width is not generally recommended.

Paving Slabs

Cement slabs or concrete slabs with cement surfaces are most suitable for paving-slab paths. The slabs should be at least 3 to 4in. thick unless a cement or mortar foundation is provided.

DESIGNS FOR GARDEN PATHS

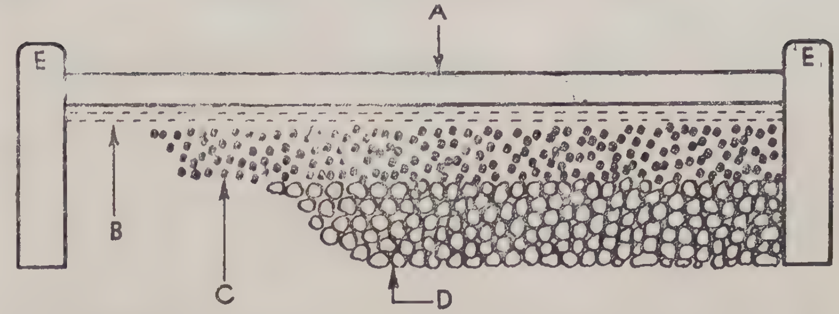


Fig. 12—Method of laying the foundation of a path. Each section must be well rammed. A—Slabs, bricks, crazy paving, or random paving. B—Fine material (sand, fine ash, etc.). C—Shingle. D—Larger stones. E—Edging walls.

Stepping stones (Fig. 9) across grass are usually satisfactory if they are well laid and if it is not intended to wheel a barrow across the path. If there is a slight variation in size, larger and smaller slabs should be laid alternately. Usually slabs are best laid about 28in. apart centre to centre and flush with the earth to facilitate mowing the grass. Where it is desired to use a barrow connecting slabs can be laid as shown in Fig. 8. Cement is difficult to obtain, but stone or cement slabs or old or new bricks make very attractive utilitarian paths. Hard or burnt bricks should be chosen.

Cobble and Paving Slabs or Stones

Large stones with flattened upper surfaces or cement or cement-surfaced concrete slabs can be used for the centre of paths made of a combination of cobbles and slabs or stones (Fig. 10). The cobble stones should be set in cement. Cobble stones are rounded, water-worn stones and for paths they may be from about 1in. to 3 or 4in. in diameter. They are usually obtained from the seashore or from a river-bed, though occasionally they may be procured from a gravel pit.

Foundation

Paths should always have a firm foundation. The depth to be excavated may be from about 6 to 18in. and will depend on the material to be used as a foundation, whether ashes, clinkers, shingle, or stone, and whether the soil on which it is to be laid is firm or loose. Width should rarely be less than 2ft.; 4ft. is a fair average for a main path. Secondary paths which bear little traffic need be only about 2ft. wide. The foundation should be rammed firm and the facing stone slabs or bricks bedded in fine material such as sand. The depth of fine material should be kept to the minimum consistent with absorbing the irregularities of the surface material; that is, if rocks or slabs of uneven thickness are to be used, the fine material should be a shade deeper than the deepest rock or section of slab. Bricks rarely vary more than ¼in. to ½in. and therefore a little more than ½in. of fine material should be sufficient. All material must, however, be firm and air pockets eliminated. Fine material can usually be settled most effectively if watered. It should, however, be reasonably dry before embedding the bricks or stones.

Care should be taken when laying down paths over drains, particularly when they have to take heavy traffic, to distribute the weight over a considerable area rather than allowing it to fall directly on the pipe or pipes under the path. This can be done by laying the pipes on a firm bed and after covering them with a few inches of soil laying over them such material as an old sheet of corruagted iron, a plank dressed with preservative, or a few lengths of old electric conduit or other piping.

Plants for Paved Paths

Where the soil is good and drainage is satisfactory a paved path can be greatly enhanced by planting certain dwarf and miniature plants along the edges or in the interstices of the paving material. Following is a selection of plants suitable (the measurements indicate height).

Acaena buchanani. Trailing, with silvery or blue-grey leaves.

Achillea tomentosa. Silvery, fern-like foliage; flowers bright yellow. 6 to 9in.

Aubrietia. Purple and red flowers. 4 to 6in.

Arabis lucida variegata. Golden foliage. 3in.

Armeria maritima and vars. Rose, red, lilac, and white. 6 to 12in.

Campanula garganica. Trailing, with mauve flowers.

Campanula muralis. Violet-blue flowers in great abundance. 4 to 6in.

Campanula pusilla. Deep-blue flowers. 3in.

Campanula kewensis. Lilac-blue, starry flowers on 3in. stems.

Dianthus Gladys Cranfield. Single-fringed, rosy-purple flowers. 3in.

Dryas octopetala. White flowers. 3 to 5in.

Echeveria aggregata. A succulent plant. 3in.

Erigeron glaucus roseus. Tufted habit; large rose-pink flowers. 3in.

Erinus alpinus and vars. Forms a dark-green carpet with rosy-purple flowers. 4 to 6in.

Frankenia laevis. Creeping; flesh colour.

Gentiana macauleyi wells. A lovely blue. 3in.

Gypsophila cerastioides. Large, white, purple-veined flowers. 1 to 3in.

Hypericum reptans. Bright yellow flowers. Up to 4in.

Mentha requieni. Carpet plant with tiny lilac-purple flowers. 3in.

Nierembergia rivularis. Leaves form a dark-green carpet with white flowers on 2 to 3in. stems.

Potentilla nitida. Pale pink. 4in.

Sagina prostrata. Green, carpeting plant.

Saxifraga miniata. Small rosettes and white flowers. 3in.

Encrusted saxifrages: *S. obristi* and *S. italica.* Very tiny.

Cushion saxifrages: *S. jenkinsae, S. irvingii,* and *Saxifraga* Lady Beatrice Stanley.

Mossy saxifrages: *S. decipiens.*

Sedum album. 3in. to 6in.

Sedum hispanicum minus.

Sempervivum montanum. Rosy red. 4in.

Thymus herba-barona. Scented. 2in.

Thymus lanuginosus. Grey leaves. 5in.

Thymus serpyllum and vars. Carpeting; flesh-pink, crimson, or white flowers. 3in.

Veronica rupestris. Trailing; blue flowers.

EFFECT OF TEMPERATURE OF WASHING WATER ON RATE OF MACHINE MILKING

By W. G. WHITTLESTON, Physical Chemist, Department of Agriculture, Animal Research Station, Ruakura.

MUCH has been said and written in favour of the use of warm water in the shed for speeding up milking. The theory behind the method is based on the fact that the natural stimulus to the cow is the sucking action of the warm, wet mouth of the calf. However, if it is believed that cows can be trained to let their milk down to the conditioned stimuli of other factors connected with milking, such as bailing up and leg-roping, there is no reason to believe that a warm-water wash would necessarily have a good effect.

IN fact, in the well-run shed where the cows are trained to an orderly procedure there is good evidence for the view that even the pulsator of the milking machine is not absolutely necessary for milking, though in this case lack of pulsation would cause cows such discomfort as to disturb the shed routine.

The experiments to be described were carried out in a shed in which a systematic routine was enforced. The normal procedure consisted of bailing up, washing the udder by directing a stream of water on to it, and massaging thoroughly, followed by the taking of a squirt from each teat into a strip cup. The warm and hot-water washing experiments to be described did not have any measureable effects on the way the cows milked out compared with this normal routine.

Plan of the Experiments

Twelve cows divided into two sets of 6 were used. The first experiment ran for 6 weeks and was divided into 3 periods of 2 weeks each. During the first period one set of cows was milked by the ordinary method while the others had their udders rubbed vigorously with a rag dipped into water at 95 to 100 degrees F. ("warm" water). Throughout the second period the treatments were reversed, while another reversal in the third period made it the same as the first.

The results were measured in two ways. At every milking the weight of milk given and the time taken from the putting on of the cups to the point at which the milk-flow rate had fallen to ½lb. of milk per minute were recorded automatically. At the afternoon milkings on Mondays, Wednesdays, Fridays, and Sundays milk-flow graphs showing the way the milk was ejected were recorded. These graphs show whether any change occurred in the response of the cow to milking treatment. The straight part of the milk-flow curve or "maximum milk-flow rate" was measured in all cases, as this is a factor less influenced by small day-to-day variations in the shed than is the average milk-flow rate obtained by dividing the milk weight by the milking time.

The following figures summarise the results of the experiment:—

Milk weights per cow per milking	**lb.**
Normal milking	9.16
Warm-water wash	9.17
Milking times	**Min.**
Normal milking	5.68
Warm-water wash..	5.72
Difference	0.04

The milking rates are obviously the same, while no differences were detected in the "maximum flow rates." In other words the use of warm water did not affect the way the cows let down their milk.

Because of this negative result and because in the case of a "problem" cow the use of "hot"-water washing had been helpful, a similar experiment was carried out on the same group of cows, but using water at 130 to 150 degrees F. This experiment was carried out over a period of 5 weeks, using weekly periods and changing the groups over three times, both groups being treated normally during the last week.

Again there were no significant differences between the response of the cows to the "hot"-water wash compared with normal methods. The results are summarised in the following figures:—

		Difference between treatments
Mean milk weights ..	8.71lb.	0.17lb.
Mean milking times ..	5.0 min.	0.01 min.
Avge. milking rate ..	1.81lb./min.	0.0lb./min.

The experiments described were carried out at the Department of Agriculture's Animal Research Station at Ruakura during December and January of the 1947-48 season. During the summer the temperature of the normal washing water varies between 65 and 75 degrees F., so that it is not "cold." However, if really hot water would cause an improvement in the letting down of the milk, the effect should have shown up in the second experiment.

The case of a "problem" cow has been mentioned. Due to certain special experiments she had become a "double milker," giving sometimes half of her milk as machine strippings. By hot-water washing this cow was made into a normal milker again. Hence it is apparent that where a cow is not letting down her milk normally hot water can be a help, but in the shed which uses a good routine the normal procedure of a thorough wash with cold water followed by the use of a strip cup would appear to be quite adequate. An examination of the milk-flow curves shows that the cows had always let their milk down when the cups were put on.

The results of the experiments described demonstrate that in the Waikato in summer the use of hot or warm washing water in the well-run shed has no effect on the efficiency of milking.

The statistical work on the above experiments was done by Miss J. G. Miller, Department of Agriculture, Wellington.

METEOROLOGICAL RECORDS FOR MARCH

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	63.4	+ 0.0	79.0	42.0	5.12	13		1.52	21	152.8
Auckland	160	64.0	— 0.9	75.3	42.2	1.85	13	— 1.34	0.85	7	171.9
Tauranga	10	61.3	— 1.2	77.7	33.2	3.99	13	— 0.08	2.62	7	219.0
Ruakura	131	58.3	— 3.5	74.4	30.2	4.26	12	+ 1.16	3.21	7	197.4
Rotorua	980	58.1	— 1.8	79.0	32.0	4.02	8	+ 0.45	3.10	7	185.6
Gisborne	12	61.6	— 0.5	82.5	37.9	1.89	8	— 1.79	0.99	7	200.0
New Plymouth ..	160	60.6	— 0.4	74.0	39.0	5.47	15	+ 1.81	2.69	7	177.7
Napier	5	61.9	— 0.4	84.3	41.6	2.06	7	— 0.61	1.90	7	216.9
Taihape	2157	55.8	— 0.8	75.6	30.3	3.64	12	+ 1.21	1.38	7	
Wanganui	72	60.4	— 0.7	77.8	42.8	2.91	10	+ 0.49	0.90	7	216.3
Palmerston North	110	59.2	— 1.1	76.5	33.0	1.88	8	— 0.51	0.77	7	210.2
Waingawa	350	58.4	— 0.4	81.5	35.6	2.67	8	+ 0.66	1.19	7	216.9
Wellington	415	58.3	— 0.9	72.8	40.5	2.54	8	— 0.49	0.91	7	214.2
Nelson	24	59.0	— 1.2	75.8	35.9	1.74	7	— 1.19	0.56	7	247.1
Blenheim	12	57.6	— 3.7	81.1	30.2	1.03	7	— 0.68	0.60	7	260.6
Hokitika	12	55.3	— 1.2	69.6	33.1	7.94	15	— 1.43	1.30	19	170.6
Hanmer Springs ..	1225	54.7	— 1.5	81.5	28.8	2.68	9	— 0.76	0.60	7	208.9
Christchurch ..	22	58.1	+ 0.1	85.8	36.2	1.95	9	— 0.01	0.67	27	224.3
Ashburton	323	56.7	— 0.6	84.6	32.1	1.71	6	— 0.48	0.75	19	213.7
Timaru	56	56.8	— 0.6	81.8	34.6	1.49	6	— 0.70	0.70	6	175.5
Alexandra	520	57.0	— 0.3	84.1	34.3	2.52	10	+ 1.37	0.65	18	204.6
Taieri	80	54.0	— 1.2	82.3	31.9	3.67	13	+ 1.41	1.03	19	
Invercargill ..	32	52.8	— 1.4	77.5	33.0	7.49	17	+ 3.12	1.80	23	130.4

Snow and Snow Raking on High-country Sheep Stations

HIGH-COUNTRY sheep farming, which is carried out on about 10,000,000 acres of New Zealand's 43,000,000 acres of occupied land, mainly along the eastern slopes of the Southern Alps in the South Island, is a very important part of the sheep and wool industry. Farming on this country, mainly covered with native tussock grasses, is highly specialised and bears very little relationship on the management side to any other types of sheep farming. The high-country farmer derives practically all his income from wool. Rabbits, erosion problems, and heavy snowfalls out of season cause high mortality every few years, and, as lambing percentages are very low, it may take years to build up flocks again after heavy losses in snow. Some of the trials and troubles which Nature lays across the path of the high-country sheep farmer, particularly during annual snowfalls, are described in this article by J. L. McLean, Sheep and Wool Instructor, Department of Agriculture, Timaru.

ONCE April has arrived thoughts as to whether the ensuing winter will be relatively mild or severe pass through the minds of both city dwellers and high-country station owners. The townsman, possibly interested in ski-ing or ice sports, is more concerned with whether the snow will be sufficiently heavy to allow him to spend weekends at his favourite ski ground or to take part in ice skating. The station owner, on the other hand, with many years of experience of good and bad seasons, looks ahead with a certain doubt. A good summer does not always precede a good winter, as station owners know, and uppermost in the mind of the high-country farmer are such questions as whether the snow will be early or late, heavy or light; and whether there will be heavy frosts to make it remain for weeks or perhaps even months on the ground.

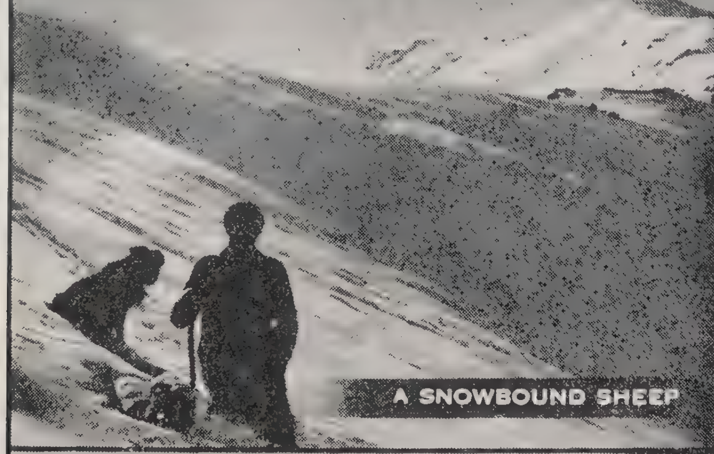
Though the high-country man may regard the pending winter with fear and trepidation, a certain amount of snow is necessary. Many of the bigger creeks and rivers are of course snow fed, but there are many smaller creeks and streams, whose origin is in springs, which are essential in providing water for the stock. These springs are generally built up by snow over winter and spring and so are able to supply water for most, if not all, of the summer.

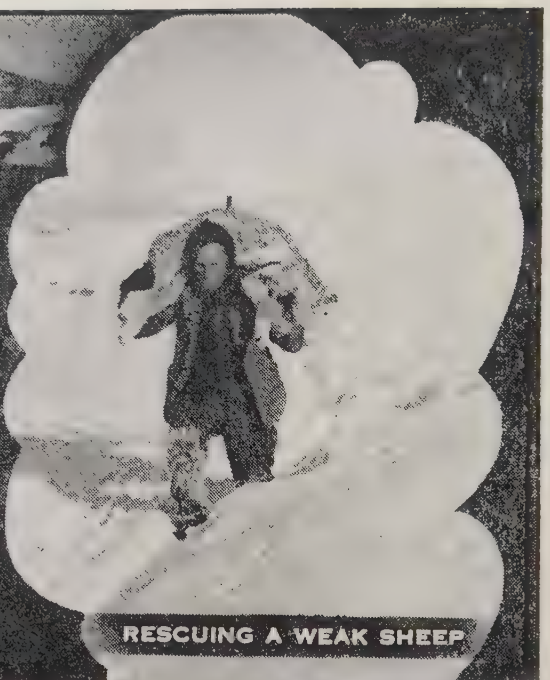
Summer and Winter Grazing

The greatest possible use must be made of feed on the mountain tops during summer, and with this end in view flocks are taken out to the higher country as soon after shearing as is practicable. This is done, of course, to conserve the more valuable fodder on the lower land for late autumn and winter use. Owing to the small acreage of arable land available and the cost of production, many station owners find it impossible to grow supplementary winter feed for their stock and are therefore dependent on these lower lands or, in an extreme emergency, on the purchase of hay.

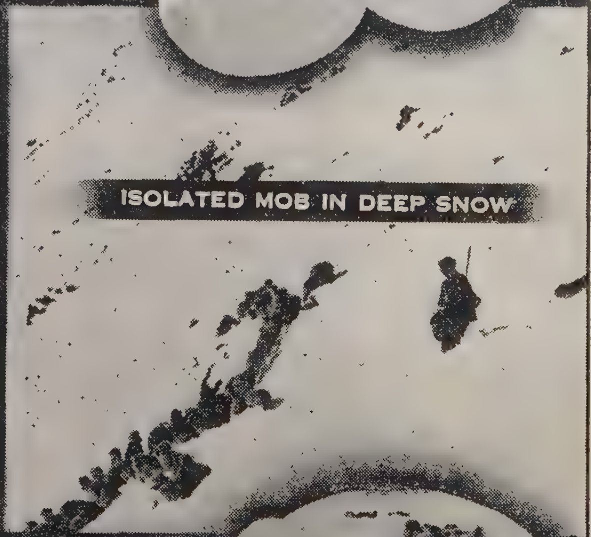
After the dipping and weaning muster in late March or April sheep are put on their winter blocks—country warmer in winter and with a less risk of heavy snow lying for considerable periods. A fall of snow at about this time is often of use, as in many cases it prevents the sheep from straying over the higher tops again and so making not only extra work for the shepherds, but also exposing themselves to the danger of being cut off and perhaps dying from exhaustion, starvation, or suffocation. The loss of a few sheep in average seasons is normally expected, but it is not these few which cause concern, but the hundreds and sometimes thousands of losses which can occur during one prolonged bitter snowstorm lasting

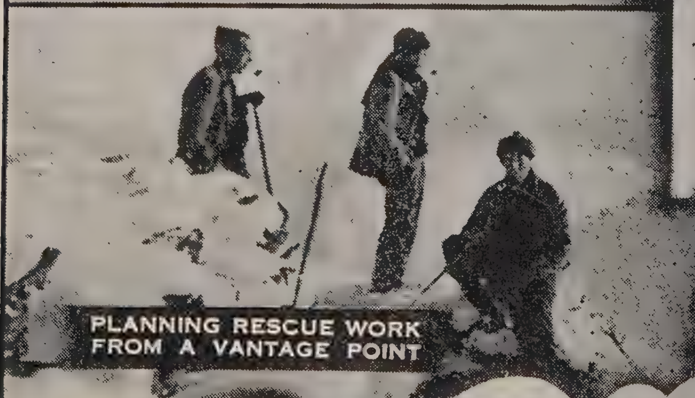
RESCUING SHEEP IN SNOW

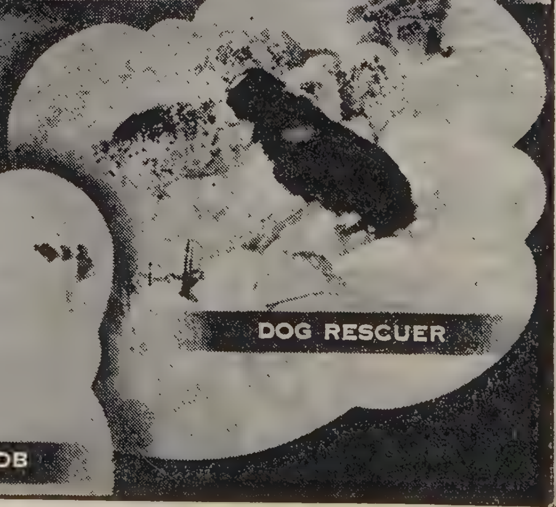

A SNOWBOUND SHEEP

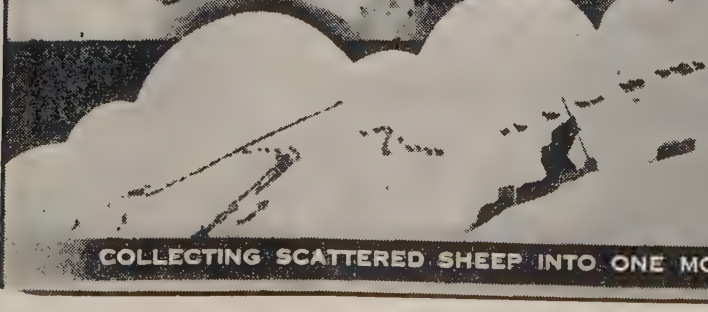

RESCUING A WEAK SHEEP

The great demands made on the stamina of men and animals during heavy snowfalls in high country are illustrated on this page. In steep and rugged country deep snowdrifts and sometimes avalanches make sheep rescue work both difficult and dangerous. Men should be well equipped and skilled in the handling of sheep, and a well-trained dog is an invaluable aid. Sheep rescued after being buried for some time in snow are often too weak to walk and have to be carried. Sometimes holes made in the snow by the breath of the sheep are the only evidence of buried animals, and it is in the location of these that dogs are particularly valuable. Mustering is extremely difficult in deep snow and the collecting of scattered sheep into one mob for ease of handling requires great patience.


ISOLATED MOB IN DEEP SNOW


PLANNING RESCUE WORK FROM A VANTAGE POINT


DOG RESCUER


COLLECTING SCATTERED SHEEP INTO ONE MOB

for days or perhaps weeks. Such a storm can transform a comparatively safe countryside into a veritable death-trap.

The high-country farmer is dependent entirely on wool for his livelihood, and if, as has happened in the past, he loses 20, 50, or even 80 per cent. of his flock in one season, only disaster would appear to be in store.

Early Days in High Country

Books and articles on the early history of sheep farming in Canterbury and Otago contain records of the hardiness and tenacity of pioneer high-country men that cannot fail to impress the reader. The names of many families honoured in connection with the early development of Canterbury could be cited, but there are many unmentioned and unsung—musterers, shepherds, labourers, and cooks—who were associated with the development of the back country and who all turned their hands to the rescue of snowbound sheep after snowstorms had swept over the country.

Snow raking now is a difficult and arduous task, but no one can fail to admire the spirit of the early pioneers in a new land, who, with virtually no communication with their neighbours, struggled to rescue their animals.

Probably one of the most disastrous losses in all the history of sheep raising in New Zealand occurred in 1867 on the Spraxton holding some miles inland from Ashburton. Before the winter of that year this place carried about 11,000 head of stock, but in one of the worst storms ever recorded in Canterbury almost the entire flock was wiped out. Such a loss must have been a heart-breaking experience for the early pioneer.

Further evidence that this season was a particularly severe one is provided by records in the diary of Mr. T. A. Phillips, manager of the Point Station not many miles distant, the following extracts from which illustrate the trials of New Zealand's pioneers of high-country sheep farming, the descendants of some of whom are still farming in the high country.

"*July 30th: Heavy snow a foot deep at sundown.*

"*July 31st: A fearful day, wind like an extra sharpened, double bladed super fine razor. Snow drifted six feet in places—average eighteen inches. No wood to be got or barely enough to cook with.*

"*August 1st: Rain, sleet, hail, snow, etc. No fire all day; go to bed at intervals. No tobacco, no water. Limited supply of grub.*

"*August 2nd: Same as yesterday, but more so.*"

The sheep losses in Canterbury alone in 1867 were 350,000 head, while losses in the whole of the South Island were in the vicinity of 750,000. There must have been many similarly disastrous but unrecorded instances in other seasons.

Avalanches have of course taken their toll of the lives of men and animals alike, and no doubt one of the most fateful in the history of snow raking in New Zealand must have been in 1879. After an exceptionally-heavy fall of snow in the winter of that year two shepherds, Smith and Morrison, lost their lives in the vicinity of Rollesby Station. They had made a track round a narrow, steep gully and were bringing sheep round the track when the mob suddenly broke up, which brought down an avalanche which carried men and sheep down to the bottom of the gully. The bodies of these two men were not found until about a month later. Heavy snowstorms entailing serious losses have occurred periodically. Another season of major disaster for the sheep farmer was that of 1895, when it snowed and froze alternately. In this year about a quarter of the flock of the famous Mt. Cook Station was lost.

Snow Raking

The work of rescuing animals marooned in severe snowstorms is termed snow raking. There is work in most walks of life which taxes man's physical and mental endurance to the utmost, but it would be difficult to find anything which calls for such courage, endurance, and perseverance as snow raking does.

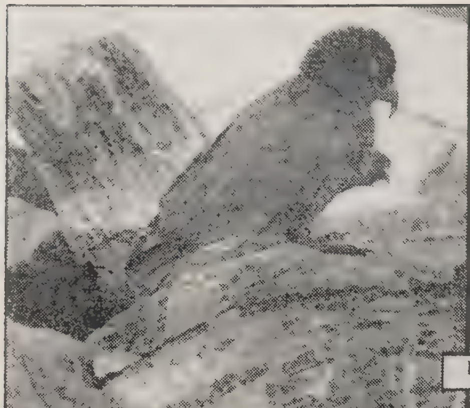
If a true picture of this exhausting and often dangerous work is to be gained, it is necessary to trace its history from the early days to the present. Primitive as it may seem, it is still the only means of rescue possible in mountainous country today. Three or four men, by walking in single file, make a track through the snow along which the sheep can travel to safer land where they may be fed. Though this trampling of the snow may seem relatively simple, it is particularly exhausting, especially for the leader, whose job it is to make the first break in the snow. This is quite often waist deep, but it is when it is frozen on top and when a hard crust just strong enough to hold a man's weight has formed that the mork is a hundredfold more arduous and exhausting. Half an hour or less in front is sufficient to sap the energy of the hardiest man, and, to lessen exhaustion and fatigue, the leader, after his spell in front, drops to the rear, where the track is reasonably formed. Whether the land was perfectly flat or whether it was rugged, this was the only method available for snow raking or rescuing sheep in the early days.

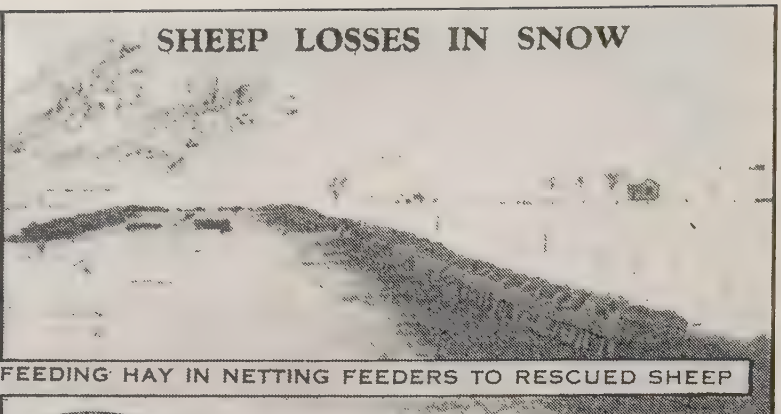
The Snow Plough

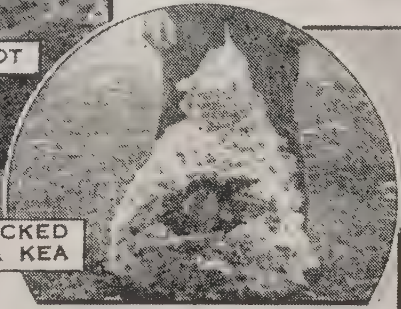
For this arduous work, however, science has again come to the aid of man in evolving the snow plough, a machine designed for pushing aside the snow and making a track for the sheep to walk on or a clearing on which to feed out. Snow ploughs have been used in the past for clearing blocked highways, but this work is now done principally by bulldozers.

The first attempt to make snow raking easier consisted of dragging a bag of boulders behind a horse, but this met with little success because of excessive wear on the bag. This method was then superseded by the dragging by a horse of a log or tree. Then came a greater advancement with the use of a horse-drawn snow plough smaller but similar in principle

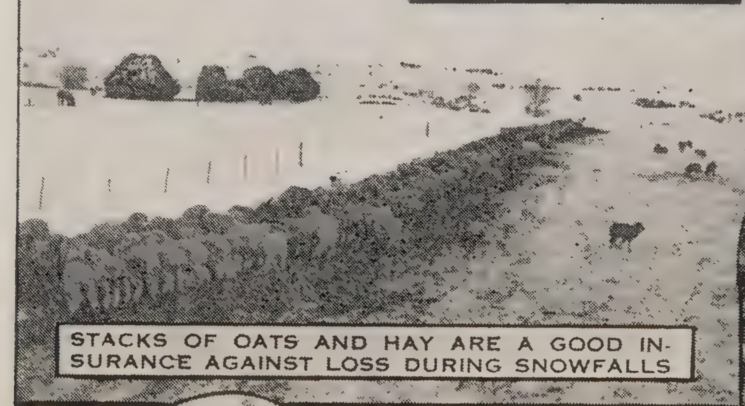
SHEEP LOSSES IN SNOW

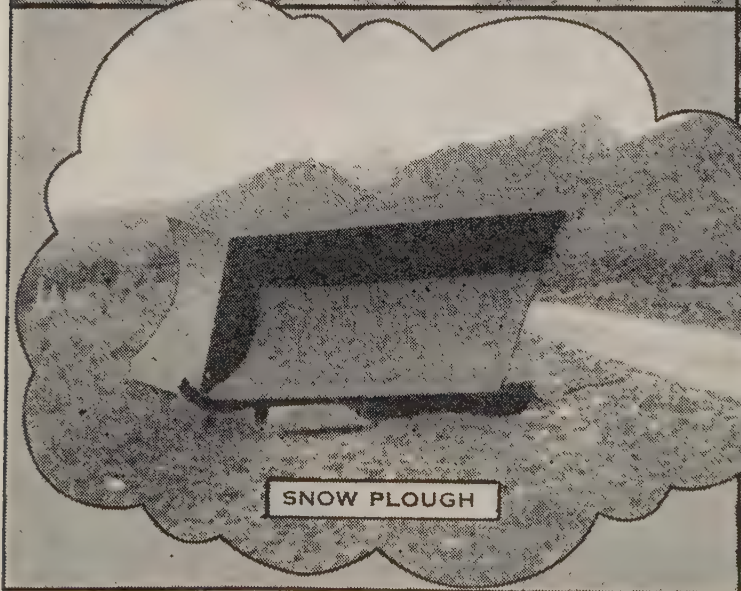

KEA OR MOUNTAIN PARROT

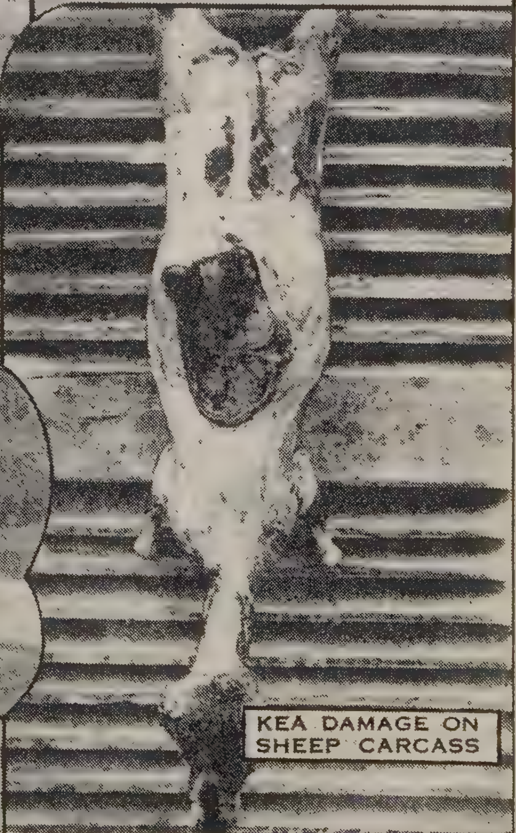

FEEDING HAY IN NETTING FEEDERS TO RESCUED SHEEP


ATTACKED BY A KEA

Use of the power-driven snow plough has been a marked advance in the history of snow raking, though the old manual method has still to be employed in high, inaccessible country. Rescued sheep brought out to safer country are fed hay in netting feeders. The kea or mountain parrot is responsible for considerable loss among sheep weakened after being snowbound.


STACKS OF OATS AND HAY ARE A GOOD INSURANCE AGAINST LOSS DURING SNOWFALLS


SNOW PLOUGH


KEA DAMAGE ON SHEEP CARCASS

[Photograph at top left by Mrs. O. M. Kent.

to the one illustrated. It is not certain when the first implement of this type was used in New Zealand, but general information indicates that use was first made of one at Raincliff near Albury in South Canterbury in 1868. The snow plough used extensively in recent years consisted of two large curved blades joined in the front to form a V-shaped implement. Attachments in the form of strengthening cross-bars are so designed and fitted that the plough can be fixed to the front of a crawler tractor. Naturally where the land is negotiable these snow ploughs save much valuable time, labour, and energy.

Experienced Shepherds Essential

The more personal side of snow raking, where the shepherds go out on the rougher and steeper mountains, can be and often is dangerous and treacherous work. What may have been a sheer cliff normally plainly visible may have disappeared under drifting snow and the locality appear level. Absolute familiarity with the country gained only by years of experience in mustering and sheep work is essential if accidents are to be avoided. Knowledge of the habits of sheep is also highly important if valuable time is to be saved. Knowing where they are likely to go when the storm is from a certain quarter makes the work so much easier.

Patience also is essential, because sheep, especially if they are in a weakened state, must be carefully handled. After several days of exhausting work from daylight till dark men's nerves are liable to become frayed. Further snowstorms or heavy fogs may confine the team of snow rakers for days to one small isolated hut.

In the Musterers' Huts

Life in the musterers' huts can be of monotonous regularity. Normally these huts are stocked during summer with tinned food and other foodstuffs which will keep. Firewood is gathered too before the winter, as this is the sole means of heating and cooking. Reading matter available in the huts usually consists of magazines of varying vintage and types. A pack of cards may find a use when it is not possible to leave the hut during the day. After a hard day's toil all that matters is the bunk, and whether it is soft or hard it always holds promise of hours of sound sleep. Cooking may be done in turns or by one slightly more adept. The opportunity for drying out clothes and boots is taken by everyone after a day in the snow.

Personal Equipment

Although personal equipment varies immensely, a quality common to all clothing worn by snow rakers is warmth. Strange as it may seem, the most effective garments for protection against wetting from snow are made from pure wool. Woollen trousers tied tightly with "snow straps" over the tops of strong boots will keep out snow for considerable periods.

Boots treated with mutton fat or other waterproofing products are absolutely essential for dry feet and the avoidance of frost bite. Frost bite, whether on the hands or feet, can be terrifically painful, and a handicap to the victim. Woollen gloves, too, may be included in the personal equipment, while the balaclava finds favour for protection of the face and head. Changes of underwear and of socks are almost vitally necessary for the snow raker.

Snow blindness is another hazard to be combated. If the sun is shining on a snowfield, particularly if the snow has melted slightly on top, the very bright, glistening reflection which results may cause a type of blindness known as snow blindness, and to prevent contracting of this painful complaint all snow rakers should wear snow goggles when on snowfields.

Binoculars are also invaluable for the location of "pockets" of sheep. Snowbound sheep may be found in small mobs of 20 or 30 or in bigger mobs of hundreds, or single sheep may be located. If snowbound sheep are in mobs, their chance of being found is considerably increased, and it is in the location of these mobs that binoculars prove their value. Their use will often save needless time and energy, because it is quite often difficult to determine by the naked eye whether what appears to be a stranded mob is really a mob or just a patch of rock appearing above the snow.

Location of Buried Sheep

There may, however, be practically no evidence of sheep about, but almost by accident a small breathing hole will be found in the snow. The sheep may be completely snowed under, but its warm breath melts the snow above and forms a small hole which is the only evidence that there are sheep buried in a particular spot. A good, well-trained sheep dog will also often locate buried sheep.

Merino sheep have been known to be buried under snow for 3 weeks and after rescue have been known to survive in spite of their weakness. The natural will of these animals to live when buried under snow is exemplified in their chewing of a very small portion of wool in an attempt to sustain themselves.

Handling Rescued Sheep

After the location of these animals the work is not finished, for they must be set on the track to lower land where they can be fed out hay or other supplementary fodder, or the snow might even be cleared to give small "pickings." Sometimes they are brought round to clear and more open faces where the snow is not so deep and allowed to graze for themselves.

Whichever course is adopted the sheep must be carefully handled, as the Merino is a wild animal whose nature is altogether different from that of the docile paddock sheep. A frightened Merino is liable to bound off the track and perhaps travel hundreds of yards downhill in deep snow until it is exhausted and unable to move further. The only course then is to go after the sheep and carry it back on to the beaten track, which is back-breaking work. When this happens to not one, but many sheep, it entails incalculable extra work and fatigue to man and animal alike.

The Destructive Kea

The fact that sheep may not be able to move at all in snow, either because of its depth, exhaustion of the animals, or a combination of both makes snowbound sheep an easy prey for the kea or New Zealand mountain parrot. This bird with its strong beak has been in the past, and can still be, particularly destructive of sheep, which it usually attacks on the back in the area above the kidneys. Death of the animals follows severe attacks, and when this happens to many sheep in a flock the loss is considerable.

The maintenance of high-country flock numbers necessitates the keeping of almost all lambs bred each season, but when losses have occurred because of snow, building up of the flock is a long and difficult process with consequent loss of income during those years. In spring there are generally repairs to fences broken or flattened during the winter and many other maintenance jobs to be attended to. The severity of the winter also has an effect on the quality of the wool clip and therefore on the returns from its production. There is, perhaps, small consolation for the troubles and consequent worries of severe winters in the high country in that snow aids in the control of rabbits, which in many high-country areas have caused great economic loss.

References

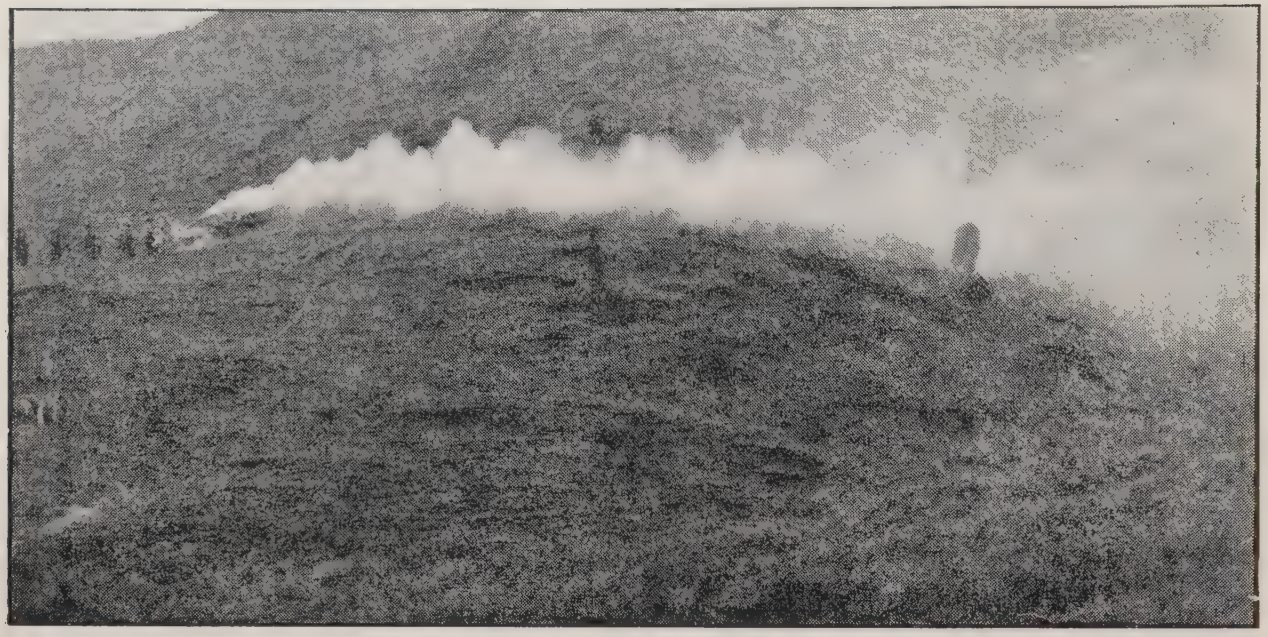
"High Country," R. M. Burdon.
"Early Canterbury Runs," L. G. D. Acland.
"The Pastoral Review and Graziers Record," October 16, 1939.

Acknowledgment is made of the assistance of Mr. D. Burnett, who supplied information on early days, and to Mr. J. B. Kirkland for supplying photographs.

PASTURE PRODUCTION IN N.Z.

As grassland farming is the basis of agriculture in New Zealand, a knowledge of pastures and their management is essential for efficient primary production. The Department of Agriculture's Bulletin No. 250, "Pasture Production in New Zealand," which has now been published in a revised edition incorporating latest developments in research, should be of great value to farmers, research workers, and students. The bulletin is divided into three parts—grasses, clovers and other allied plants, and pasture management—and its object is to discuss the means by which the best value from both plants and animals may be secured. Copies of this publication may be obtained from offices of the Department of Agriculture at Auckland, Palmerston North, Christchurch, and Dunedin. The price is 2s. 6d., post free.

Blower Equipment for Hill-country Topdressing



By C. J. HAMBLYN, Fields Superintendent,
Department of Agriculture, Palmerston North.

HAND topdressing of hill country is difficult and arduous. With modern tractor equipment and where tracks have been bulldozed up the slopes, fertiliser can be got on to the ridges ready for spreading easily enough on most hill country, but spreading still has to be done by hand. It is slow, heavy, costly work, and because of the rough nature of the surface and the hard going across the steeper slopes, the actual spreading is seldom done with any degree of evenness, which is the aim in topdressing on flat land. Though there are hopes that the aeroplane will provide a solution to the problem of getting fertiliser on to hill country, some recent developments in a technique based on the idea that fertiliser, if sufficiently fine, could be carried over hill country by wind, have reached the stage where extensive practical tests are about to be made.

A ROTARY fan acting as a blower is used to get the fertiliser sufficiently high into the air to be windborne. The fertiliser is fed into the blower from a hopper, passing through the fan to be blown out of a short pipe into the air. With material as fine as basic slag, and a slight breeze, fertiliser is carried out across the country like a smoke screen and settles down as a fine dusting wherever the dust cloud is carried. The fan is operated at high speed by a light portable engine or it can be driven from the power take-off of a tractor.

Superphosphate being spread by the blower.

By shifting the machine to strategic points along the ridges to make the best of the wind to get the widest possible coverage of the area being topdressed, and taking into account that fertiliser is just as readily carried up the slopes from the floor of gullies by the wind, it is possible to get a surprisingly-good coverage on typical hill country. Demonstrations and trials in the Wellington district with the first machines built for this type of topdressing indicated clearly that the technique has possibilities.

A number of different types of phosphatic fertilisers and lime have been tried and the general opinion is that materials should be sufficiently fine to be carried along by a mild breeze—it appears that they should be as fine as basic slag or North African phosphate.

As such fine material is employed, the question arises as to what proportion would be carried away beyond the area it is intended to topdress. The impression given by the early demonstrations is that surprisingly little is carried up in the air currents or carried extreme distances across country—the problem still seems to be to get the material carried sufficiently far to give a coverage of a typical big hill-country paddock. The really important point at present is that the technique seems to be much more practical than it would at first appear.

The rate of application can be really fast, trial machines having put out 1 to 1½ tons per hour. With experience and judgment and knowledge of a particular area, operators should be able to spread the fertiliser to give a satisfactory cover.

If 10 tons of fertiliser is to be applied to, say, 100 acres, the type of machine described, used with intelligence, can at least put the fertiliser into the area and spread it over most of the 100 acres. Observations of hand topdressing, particularly contract work, indicate that the spreading of fertiliser is far from even—it goes on in swaths, heavy in some places and light in others, and much of the country gets nothing.

As the blower system of topdressing hill country is still in the development stage, further tests of the results of the work are desirable.

Symptoms and Control of Fowl Pox

LAST year about this time outbreaks of fowl pox began to occur in New Zealand, and fresh cases continued to appear during the late autumn and winter. Many poultry farmers suffered considerable financial loss from reduced egg production, which could have been avoided if affected flocks had been treated promptly and correctly. In this article A. C. Howse, Poultry Veterinary Officer, Department of Agriculture, Wellington, describes the symptoms to be looked for and measures which should be taken if the disease breaks out.

OUTBREAKS of fowl pox usually occur during autumn and winter. Last year there were numerous outbreaks in different parts of the North Island, some of which resulted in considerable needless loss, either because they were untreated or because treatment was delayed unduly. If energetic measures are taken immediately the disease is known to have broken out, the temporary drop in production which an outbreak causes can be reduced very considerably.

Pox diseases are common in many species of animals and are well known. They include sheep pox, cow pox, and pigeon pox in animals, as well as smallpox and chicken pox of the human species, the latter mainly affecting children. Fowl pox, sometimes incorrectly referred to as chicken pox, affects domestic fowls and, more rarely, turkeys, ducks, and geese.

All pox diseases are caused by what are known as filterable viruses—germs which live and multiply actively in the tissues, spreading infection from animal to animal, but which are too small to be seen by powerful microscopes. They are called filterable because they are small enough to pass through the pores of certain unglazed porcelain filters, which would retain the similar but larger bacteria. Pox viruses have a particular affinity for the outer layers of the animal body—for skin and mucous membranes—where they produce their characteristic effects.

Symptoms and Effects

Fowl pox occurs in three different forms:—

The skin or cutaneous form, showing small wart-like growths on the comb and wattles.

The so-called diphtheritic roup, in which yellow, cheesy growths occur on the mucous membranes within the mouth, and sometimes near the entrance to the windpipe or trachea. If these yellow growths are removed, a raw, red area is revealed beneath.

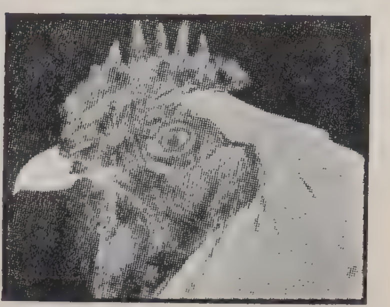
The oculo-nasal form, which causes swollen, "bunged up" eyes and a thin, watery discharge from the nostrils, resembling ordinary catarrh.

All three forms are caused by the same virus and may occur in different birds in the same flock. Infection from a bird affected with one form may spread to another bird and cause another form of the disease, as the particular manifestation which results depends only on the part of the skin or mucous membrane to which the virus gains entry.

The virus cannot infect through unbroken skin but does so through small cuts or abrasions, such as occur on the comb as a result of pecking and fighting or in the mouth through the picking up of small, sharp stones. After an incubation period of a week or 10 days symptoms appear. In the cutaneous form small blisters containing fluid appear on the comb; these soon rupture, changing to the characteristic warty or scabby growths, which are small but may coalesce to form larger scabs. If the mucous membranes are affected, the yellow growths described appear within the mouth, while other birds in an affected flock may exhibit the so-called "roupy" appearance of swollen eyes and nasal catarrh. There are also loss of condition and a drop or cessation of egg production in affected birds.

Though virulence may vary in different outbreaks, fowl pox as a rule does not cause a high death-rate. In the outbreaks which occurred last year in New Zealand the mortality was low and most of the birds which died did so as the result of blockage of the windpipe by yellow growths occurring at the back of the mouth, causing suffocation.

More serious effects are the loss of condition and decline in egg production which invariably occur. Lowered production usually persists for about 6 weeks, and as the disease, if unchecked, will spread rapidly through a flock, financial loss may be considerable.



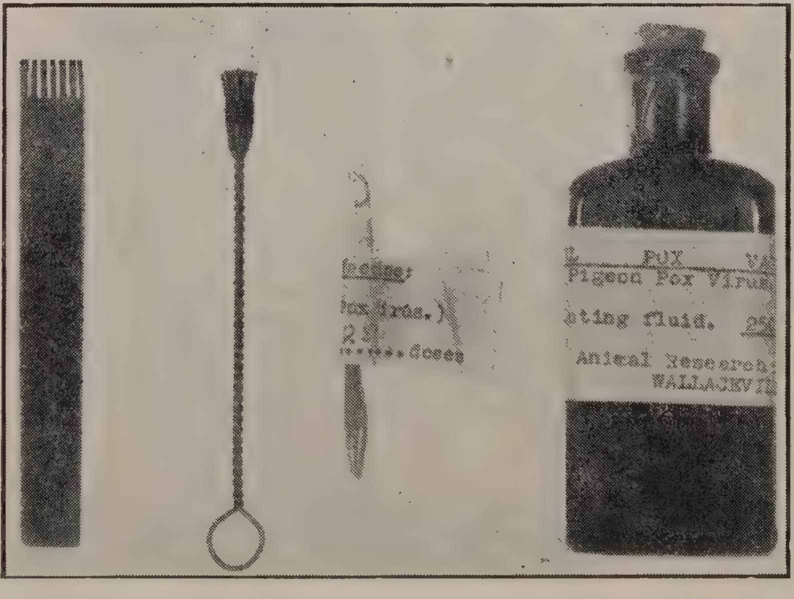
[Reproduced from "Diseases and Parasites of Poultry," by E. H. Barger and L. E. Card, published by Henry Kimpton, London.

The appearance of fowl pox lesions on the comb and wattles of a bird about 10 days after natural infection.

Immunity through Vaccination

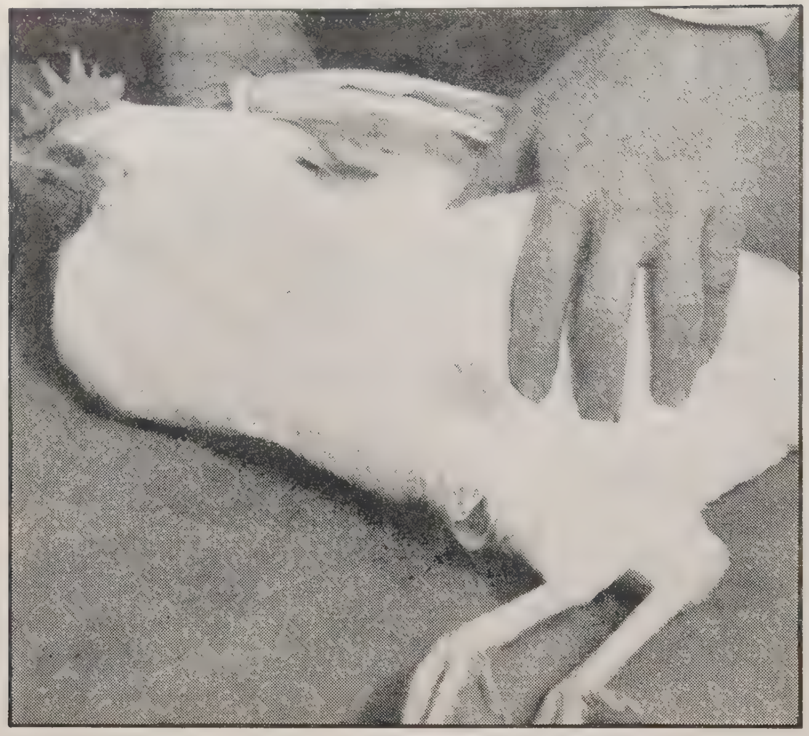
Fortunately, however, effective preventive measures can be taken against this disease. Stocks of vaccine made from pigeon-pox virus are held at the Department of Agriculture Animal Research Station, Wallaceville, and are available for the inoculation of infected flocks. Vaccination of humans against smallpox is performed not with smallpox virus but with the virus of cow pox; similarly, vaccination of fowls with pigeon-pox virus confers immunity against fowl pox.

The immunity conferred is neither very strong nor of very long duration but is useful in checking an outbreak. The pigeon-pox virus is supplied by the Animal Research Station in a small phial with a bottle of diluting fluid. Before vaccination is carried out the virus in the small phial is poured into



A scraper suitable for preparing the bird's skin for vaccination, and the brush, virus, and diluting fluid as supplied.

CONTROL OF FOWL POX



A bird prepared for vaccination with pigeon-pox virus by the removal of a few feathers from the outside of the thigh and the rubbing of the skin to redden it.

the diluting fluid and shaken to ensure thorough mixing. A few feathers are removed from the outside of the thigh and the bare area rubbed with such an instrument as that on the left of the photograph on the previous page. Sufficient rubbing to produce a reddening is all that is necessary. The area is then painted with the vaccine with the brush provided. A slight local reaction may be detected in about 7 days. The vaccine is supplied on application, with brush but without scraper, at a cost of 1d. per dose. It is packed in 250 dose lots, as packing it in a smaller quantity is not practicable.

Therefore, if fowl pox breaks out in a flock, all affected birds should immediately be collected and isolated in an effort to limit the spread of infection. These should not be vaccinated, as they are already developing immunity as a result of the disease. Dry-mash feeding should be stopped and birds put on to wet mash, as flakes of dry mash, sticking to the mouths and nostrils of affected birds, are pecked at by others, so facilitating the spread of infection. It is also of advantage to put outside the doors of houses receptacles containing disinfectant into which boots may be dipped when entering or leaving so as to reduce as far as possible the spread of infection from house to house.

In addition, all non-affected birds on the farm above the age of 8 weeks should be vaccinated immediately with pigeon-pox vaccine in the manner described. Immunity will develop in about a week, and until then birds should be shielded from gross infection as far as possible. The immunity conferred is neither solid nor lasting but is sufficient to tide the birds over the outbreak. Vaccination with pigeon-pox virus does not produce any violent reaction in the birds treated, so that egg production is not affected.

In Australia and elsewhere overseas vaccination is practised not with pigeon-pox virus but with a weakened or attenuated strain of the virus of fowl-pox itself. This has the advantage that birds so treated are solidly immune for life, as they would be after an attack of the disease, but the great drawback to this method is that a reaction is set up in birds older than about 3 months, and if it is applied to birds in lay, they are put out of production for several weeks. Fowl-pox vaccine is therefore not suitable for checking an outbreak, but is extremely useful as a purely-preventive measure by the routine vaccination every year of all young stock between the ages of 8 and 12 weeks. However, care has to be exercised in the use of fowl-pox virus, as careless handling might result in an outbreak of the disease, and so far its use on a general scale has not been permitted in New Zealand. However, last year the stock on one or two farms were vaccinated by this method with vaccine prepared by R. Salisbury, Veterinary Research Officer, Wallaceville Animal Research Station, and if results prove satisfactory and facilities become available for the production there of fowl-pox vaccine on a sufficiently-large scale, it is hoped to make this service available for general use under reasonable supervision.

Action if an Outbreak Occurs

To summarise, if fowl pox breaks out on a farm—and during the next few months is when it is most likely to occur—the following steps should be taken:—

The owner should make sure that it is fowl pox with which he is dealing. In cases of doubt the nearest Veterinarian or Poultry Instructor of the Department of Agriculture should be consulted, or the carcasses of a few typically-affected fowls should be sent to the Wallaceville Animal Research Station, Private Bag, Wellington, with a letter giving the name and address of the sender and any information about the outbreak which is considered to be of importance.

Sick birds should be isolated immediately.

If the existence of the disease is definitely established, all unaffected birds older than 8 weeks should be vaccinated with pigeon-pox vaccine, obtainable from Wallaceville. If the owner does not know how to do this, a Veterinarian or Poultry Instructor of the Department will help.

Wet-mash feeding should be substituted for dry, and troughs removed and cleaned between feeds.

Receptacles containing disinfectant into which boots can be dipped should be put at the entrances to all fowl-houses.

One final word of counsel: Some owners of flocks affected with fowl pox spend many hours dipping the heads of unfortunate birds into solutions of disinfectant and other noxious liquids. Such efforts are a waste of time, and birds which recover do so despite the treatment and not because of it. Affected birds should be handled as little as possible so as not to carry infection to others which may be healthy.

◆

Award for Poultry Husbandry Research Work

AN international award recently inaugurated by the Poultry Association of Great Britain, and known as the Tom Newman Memorial Award, consists of a medal and cash prize of about £50 annually for the best piece of research work of benefit to poultry husbandry performed in any country. The Poultry Veterinary Officer of the Department of Agriculture, Wellington, has agreed to act as corresponding secretary for New Zealand in connection with the award, and anybody wishing to enter or desiring further information should communicate with him.

The prize is open to any person of either sex without restriction as to occupation. Papers describing the work which it is desired to enter for the 1949 award should be in the hands of the corresponding secretary by January 1, 1950.

◆

Standards of Efficiency of Pig Production

NEW ZEALAND'S pig industry is unique because it is based almost wholly on the utilisation of the by-products of the dairy industry. It has been estimated that if the available by-products were efficiently utilised, there would be sufficient for the production of about 70,000 tons of pig meat, which represents the production of 1,500,000 pigs in equal proportions of porkers and baconers. The maximum output that has been achieved so far was 1,100,000 pigs in 1938 and the highest weight produced in any year was 53,000 tons in 1941, when a special effort was made to produce as much bacon as possible. Since then production has fallen off to the extent that over the last three seasons it has been lower than 650,000 pigs. The systems under which these pigs are produced and some standards of efficiency by which each producer can gauge his own production efforts are dealt with in this article by A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington.

DAIRY by-products, particularly skim-milk and buttermilk, have a high food value for pigs, and if it were not for the fact that under the economic conditions of the industry in New Zealand they are the "cheap" basic foods, much more care would be taken to ensure that the best use was made of them as foods. This would entail the use of considerable quantities of other foods to balance the ration and so get the full value from the high-quality constituents in the dairy by-products. As dairy by-products are seasonal in supply, other foods are necessary in any case. Within the limits of economic management the New Zealand producer can supplement his basic feed as follows:—

	Food units
Skim-milk, buttermilk, or whey ..	60
Grass, roots, and forage crops ..	30
Concentrates	10
Total	100

One food unit equals 1 gallon of skim-milk, 2 gallons of whey, or 1lb. of good pig meal, barley, maize, peas, wheat, or pollard, 10lb. of mangolds, swedes, pumpkins, kales, etc., 8lb. of carrots, lucerne, or good grass, 6lb. of sugar beet, 5lb. of apples or artichokes, and 4lb. of cooked potatoes. Much higher relative food values are obtained for dairy by-products when they are used in small quantities in conjunction with grain.

In Denmark, where skim-milk is used to the extent of 20 per cent. of the ration for weaners down to less than 10 per cent. for baconers, together with grain and up to 10 per cent. of roots, the feeding value of skim-milk is calculated on the basis of 0.6 gallon equals 1lb. of meal.

The actual production of pig meat over the last 3 years compared with the production possible from dairy by-products available for pig feeding and from the feed supply organised on the basis set out above are shown in Table 1.

The actual production, though based on the average production over the last three seasons, is necessarily an estimate as far as each section of the total is concerned. It is, however, based on the known quantities of the various feeds available for pig feeding.

Comparison of this total with the others indicates that since a certain amount of supplementary feeding is necessary to make use of the dairy by-products at all, the overall level of efficiency of food conversion is not as high as that used in calculating the theoretical possible production from the by-products alone. It also shows that the actual level of supplementary food provision falls far short of that desirable to make the most effective use of the basic feeds.

The standard used in Table 1 for converting food units to pig meat is 6lb. of food produces 1lb. of pig meat.

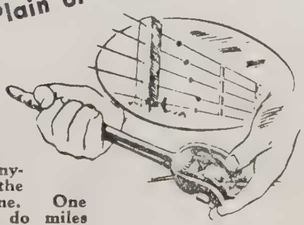
TABLE 1—ACTUAL AND POSSIBLE PRODUCTION 1945-46 TO 1948-49

Basic feed	Actual production (tons meat)	Possible production (tons meat) From basic feed alone	Possible production (tons meat) Basic Feed plus supplements
Skim-milk	32,250	31,000	50,000
Whey	3,100	3,000	5,000
Buttermilk	1,865	1,800	3,000
Garbage (including orchards) ..	1,250	1,200	2,000
Butchers' offal	1,035	1,000	1,500
Total	39,500	38,000	61,500

- ● NO MORE WIRE CUTTING
- ● NO SPLICING
- ● WILL NOT WARP OR BEND

"Permanent" P.A.T. WIRE STRAINER

For Plain or Barbed Wire



Fitted anywhere on the fence line. One man can do miles of fencing in a day. Just 10 seconds to fit and lock . . . takes up 18in. of slack. SEE THIS REVOLUTIONARY NEW STRAINER AT YOUR NEAREST HARDWARE STORE OR STOCK AND STATION AGENTS.

D. HUNTER & CO. LTD.

Box 278 Dunedin, Sole Manufacturers.

TIGHT LOCK SHEEP & PIG FENCES

Made by **Cyclone**

With stiff straight stays, 12in. apart for Sheep, 6in. apart for Pigs. The fence that strains up even, firm, no sag or slackness. No other fence has these points.

FIRM ORDERS CAN NOW BE PLACED WITH YOUR STOCK & STATION AGENTS OR MERCHANT FOR 1950 DELIVERY!

Two other good Cyclone Fences are:
REFERENCE 823
REFERENCE 830 (Docking Interlocking Type)
Sole New Zealand Manufacturers:

CYCLONE FENCE & GATE CO. LTD.

CHRISTCHURCH - PALMERSTON NORTH - AUCKLAND

Elliotts

announce their

AUTOMATIC DIAPHRAGMATIC *Phenothiazine* INJECTOR

which is used with the ready mixed liquid phenothiazine

PHENZEEN PLUS

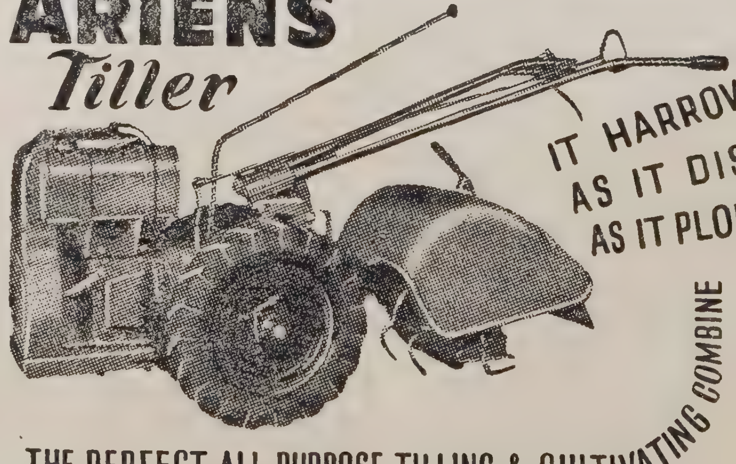
for a complete and practical drenching treatment. It gives you speed without hurrying and avoids waste, drip and slobbering. Stockists everywhere or write to the

N.Z. DISTRIBUTORS . . .

PREMIER PRODUCTS LTD.

Huddart Parker Buildings, Wellington.

ARIENS *Tiller*



THE PERFECT ALL PURPOSE TILLING & CULTIVATING COMBINE

The Ariens-Tiller is designed to meet all the requirements of the nurseryman, florist, gardener, seedsman. Simplified controls make operation easy, even in small spaces . . .and it can be used in wet or dry seasons.

In one operation, the Ariens-Tiller completely pulverizes and mixes the soil, leaving a properly prepared weed-free seed bed.

FOR FURTHER INFORMATION WRITE TO:—

DORING IMPLEMENT SUPPLIES LTD

P.O. Box 1179, WELLINGTON - - P.O. Box 1203, CHRISTCHURCH
P.O. Box 68, FEILDING.

This is a reasonable average to aim at, allowing for the food used by the breeding stock. If consideration is given to the gains in individual lots of fattening pigs up to 200lb. liveweight, the basis for these pigs should be 3 to 4.5 food units to produce 1lb. of liveweight gain or 4 to 6 food units per pound of carcass weight gain.

As pigs grow the amount of food consumed for each pound of gain increases progressively. Table 2, adapted from Henry and Morrison's "Feeds and Feeding," shows that the amount of food per pound gain increases rapidly up to 200lb. liveweight. Thereafter the requirement increases more gradually.

TABLE 2—STANDARDS OF EFFICIENCY OF FOOD CONSUMPTION AT VARIOUS LIVEWEIGHTS

Liveweight of pigs lb.	Actual average weight lb.	Total number of animals fed	Average feed eaten daily food units	Feed eaten per 100lb. liveweight food units	Average gain per day lb.	Feed per lb. l'wt. gain food units
15 to 50 ..	38	174	2.23	5.95	.76	2.93
50 to 100 ..	78	417	3.35	4.32	.83	4.00
100 to 150 ..	128	495	4.79	3.75	1.10	4.37
150 to 200 ..	174	489	5.91	3.43	1.24	4.82
200 to 250 ..	226	300	6.57	2.91	1.33	4.98
250 to 300 ..	271	223	7.40	2.74	1.46	5.11
300 to 350 ..	320	105	7.50	2.35	1.40	5.35

Importance of Heavy Weaning Weights

It has been noted frequently that pigs which are heaviest as weaners maintain their advantage throughout the fattening period. On the average the weight at 8 weeks is three times that at 3 weeks, the 16 weeks weight is 2½ times that at 8 weeks, and at 26 weeks the well-grown weaner should make a bacon weight about double the 16 weeks weight. Examples of typical differences are set out in Table 3.

TABLE 3—GROWTH OF WEANERS OF DIFFERENT WEIGHTS UNDER UNIFORM MANAGEMENT

3 weeks lb.	8 weeks weaning lb.	16 weeks porker lb.	26 weeks baconer lb.
16	50	125	250
13	40	100	200
10	30	75	150

The 40lb. weaner will make a baconer which will dress at 146lb. at 26 weeks, the 50lb. weaner, with restricted feeding in the later stages, will make the same weight about 2 or 3 weeks earlier, and the 30lb. weaner will require a month to 6 weeks' extra feeding than the 40lb. weaner.

The food consumption figures emphasise the economic importance of heavy weaners. Results of feed trials show that pigs which averaged 45lb. at 8 weeks produced 1lb. liveweight increase for 3.5lb. of feed, and light pigs averaging 29lb. at 8 weeks required 4.25lb. of feed for each pound of liveweight increase up to porker weights.

This means that the light pigs required an extra 120lb. of feed to reach the same killable porker weight. The difference to baconer weight is about double this. If a food unit is valued at 1d. the difference in profit between the well-grown and the poorly-grown weaner is £1. When the extra labour and overheads associated with the six weeks' extra feeding of the lighter pig are taken into consideration the advantage of selecting sows capable of rearing good pigs and of giving these a really good start by creep feeding is obvious.

This is the basic reason for sow recording. By the more extensive use of this method the efficiency of the national breeding herd could be materially increased.

Heavy Litters

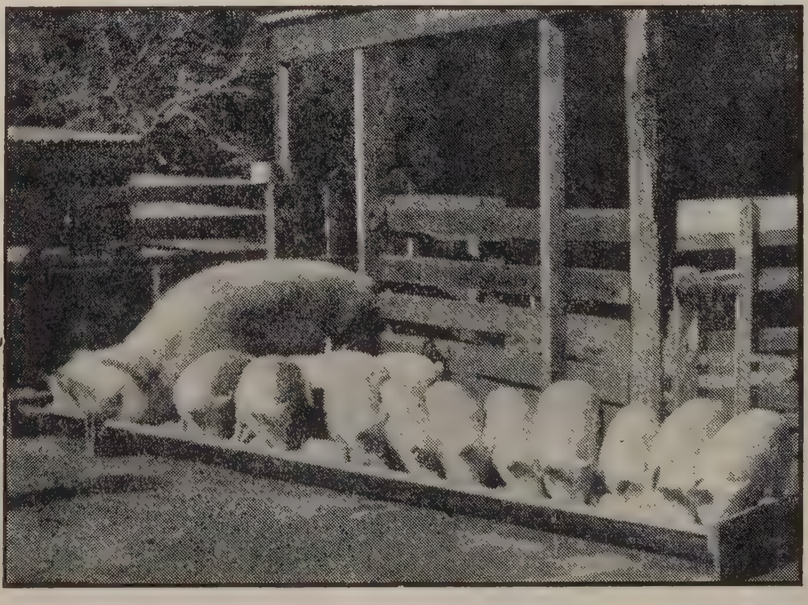
Heavy individual weights are obtained in large litters as frequently as in small ones. The standard which should be set is 9 or 10 pigs reared per litter and averaging 36 to 40lb. at 8 weeks. Good management of the sow is the key to success in this and is the most important factor in laying the foundations for successful fattening. The officially-recorded litter of 15 pigs which averaged over 64lb. at 8 weeks recently is an outstanding example.

Efficient utilisation of the present breeding sows demands that more of them have two litters per year. In recorded litters an average of 9.4 piglets are born and 7.3 are weaned. If all the 68,000 sows on New Zealand farms in 1948 had produced two litters in each of which 6.5 pigs had reached market weight, the total pigs slaughtered would have reached 884,000. The actual slaughterings were 650,000. On the basis of 6.5 pigs sold per litter this means that only a little more than half the sows farrowed two litters in the year, or if the assumed number marketed per litter is correct, sows in this country average 1.3 litters per year.

The aim should be 8 pigs marketed per litter and two litters per sow per year. The ideal of two litters for each sow is almost impossible, but with the target set high it will be possible to achieve the standard of 14 pigs marketed per sow each year, which is at present attained by those who are careful to ensure that their sows are well managed at all times. Based on this performance, a standard of 1400 to 1500lb. of pig meat per sow should be attained under average conditions where portion of the output is as baconers and part porkers. The sow-cow ratio will depend on the type of basic food supply and the type of output aimed at.

Systems of Production

Before laying down further standards an analysis should be made of the various systems of production which are used in the pig industry in New Zealand. Within the skim-milk feeding group there is a wide variation in systems of production from those who breed and sell pigs mainly as weaners and stores to those who do not keep sows, but buy all their requirements mainly through saleyards as weaners or stores. Probably the system which yields the best profits is that of breeding all one's own requirements for fattening as baconers or porkers, whichever command the higher price, and having a few surplus weaners for sale when the markets are good. Care in arranging farrowing dates and provision of suitable farrowing accommodation as well as thorough understanding of and keenness for the management of the breeding stock are, of course, essential to the success of the system.



Large litters of heavy pigs are the basis of profitable pig production. This litter of 15 averaged more than 64lb. at 8 weeks.

KEEP THE WHEELS TURNING

Speed Railway Wagons, Speed Production

In its response to the demands for still more produce, industry places a heavier load upon the Railways. Rapid transport is vitally necessary in order that the Dominion's domestic needs may be met and that the Mother Country also shall have the fullest benefit from our drive for increased production. Help maintain the drive by quickly releasing railway wagons and tarpaulins. They are required elsewhere. Delay in unloading impedes the national effort.

Collect Consignments Quickly

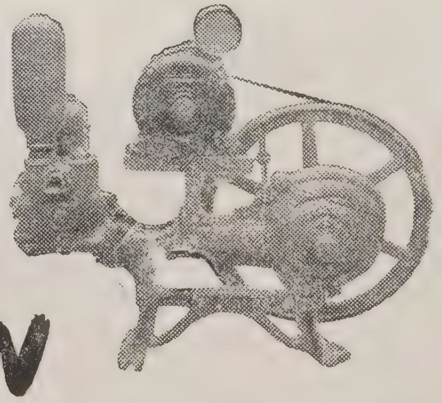
PROVED!

ON FARMS ALL OVER N.Z.

The popular Renown Double-Acting Belt Driven Service Pump gives the same service as a city high pressure supply; two models, pumping 280 and 350 gallons respectively.

Write or call for Free literature and information covering the Renown line.

W. H. PRICE & SON LTD. 34-36 Manchester St.
Christchurch.
P.O. Box 1084.



RENOWN

PUMPS & AUTOMATIC PRESSURE SYSTEMS

ELASTRATOR PROVED QUICKER SAFER THAN THE KNIFE

Experience has shown that ELASTRATOR is safer. It's bloodless, prevents dangerous infection, and fly strike is usually completely eliminated. Lambs don't suffer from shock and "mother-up" at once. Top-price carcasses result. Get full particulars about ELASTRATOR from your Stock Agent, or direct from ELASTRATOR Co. Ltd., Box 226, Blenheim.

This is the Modern Method. The rubber ring is affixed to the purse above the testicles. Circulation is stopped. The testicles and purse atrophy and fall off, completing castration.

ELASTRATOR CASTRATION
BLOODLESS AND SAFE!

the world's largest market

Within a radius of 100 miles of the London docks live 21,000,000 people, representing the world's greatest consumer market. The Port of London Authority with 44 miles of deep-water dock quays, 1,500 cranes and vast storage capacity, offer unique facilities for all who send their goods to this great market.

IS SERVED BY THE **Port of London**

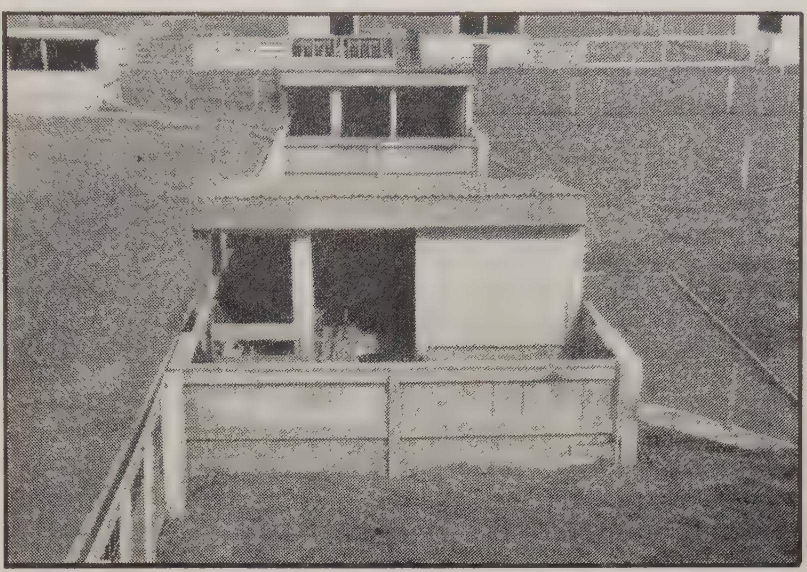
Write on your business notepaper to the Australian and New Zealand Representative, 22, Loftus Street, Sydney, for the P.L.A. booklet "Facts and Figures."

"THE NEW ZEALAND JOURNAL OF AGRICULTURE"
Subscriptions: 2/6 a year, 4 years 10/-.
Subscriptions may be paid at any office of the Department of Agriculture.

Whey feeders in the main adopt one of these practices: 1. Breeding for the weaner market, thus seeking to avoid the awkward stage after weaning when whey, unless carefully used and properly supplemented, may appear to be an unsuitable food; 2. breeding their own requirements and fattening them either as porkers or baconers; and 3. fattening only and buying in well-grown stores for the purpose.

Buttermilk feeders mainly find it necessary to buy stores to consume the rapidly-increasing supplies of buttermilk in the flush months. In other cases good management and conditions enable the breeding to be done of all the pigs required and again this improves the net returns from the enterprise, as stores are invariably expensive when required to cope with the rising milk supply. Production is practically wholly as baconers, unless drought causes a sudden drop in the quantity of milk and the number of pigs on hand is too great to take up to bacon weights. The heaviest pigs are generally sold first.

In a recent survey of pig feeding on garbage and butchers' offal it was found that though more than two-thirds of the garbage feeders who made returns kept sows, only a little more than one-third of the offal feeders did so. Offal feeders, being mainly butchers themselves, kill most of their pigs for their own pork trade, but garbage feeders have a more varied output, depending on the situation of the farm. The larger establishments concentrate on baconer production, though from the curer's point of view garbage is an unsatisfactory feed for this purpose. At the other extreme are garbage feeders who keep a high proportion of sows and have a good outlet for weaners. In between is a variety of intermediate types of production.



Control farrowing houses with concrete yards and a grass run are required in most districts to achieve the best litter results.

Production on Offal and Garbage

Both garbage and offal must be boiled or steamed for use as a pig feed and any excess fat removed. Before being cooked the stomachs and intestines of butchers' offal should be emptied of contents. It is usually boiled in up to one and a half times its own weight of water. The "soup" or "stew" after boiling is about double the original weight of offal. There is about 25 per cent. of dry matter in the fresh offal, and after allowing for the varying amounts of bone, etc., there will be 10 to 15 per cent. of edible dry matter in the cooked food. As far as possible this should be fed warm to get the full value for the fuel used in cooking. The offal is, of course, protein rich and is ideal for feeding with whey. Some grazing is desirable under this system. Fed with cooked potatoes, cereal grain, or meals, offals form the basis of a well-balanced ration for pigs. In this way the offal from 25 cattle or 100 sheep should produce 100lb. of pig meat.

Garbage is a much more variable food. The percentage of dry matter varies from 25 to 30, but is of lower quality than that of offal. It contains less protein and more fibre and is therefore of lower digestibility.

Henry and Morrison (1923), speaking of American conditions, say that on an average, and allowing for normal losses of pigs from death by disease and injuries caused by glass, metal, etc., 1 ton of municipal garbage may be expected to produce 40lb. of liveweight. Woodman (1941) states that 3½ tons of unprocessed swill is equivalent to 1 ton of pig meal. This makes 1 ton of swill equal to more than 5cwt. of meal. If it takes 5lb. of meal to produce 1lb. of live pig, 1 ton of swill would produce 100 to 120lb. liveweight compared with a maximum of 80lb. given by Henry and Morrison. Because of the large range of quality in swills from different sources it is difficult to lay down any standard for efficient utilisation; 100lb. of pig meat may be produced from 1½ to 3 tons of garbage according to the quality.

The figures quoted for both offal and garbage conversion exclude feed used by breeding stock. A further allowance of 10 per cent. to cover these should be made on farms where all pigs are bred on the place.

Sow-Cow Ratio

In New Zealand 26 cows are milked for every sow carried, and since some sows are on farms which are not dairy, the ratio on dairy farms must be even wider. With efficient management and the provision of supplementary feeds the ratio should be along the lines indicated in Table 4.

TABLE 4—SOW-COW RATIO ON DAIRY FARMS ACCORDING TO TYPE OF FEED AND OUTPUT

	No. of cows per sow		
Feed	Weaner production	Porker production	Baconer production
Skim-milk	5	8	12
Whey ..	10	15	22

Government Loans for Pig Housing

As the result of a suggestion made by the Pig Production Committee of Federated Farmers for a special scheme to encourage the breeding of more pigs the Government has agreed to advance loans for the provision of pig housing.

Loans will be made either through the State Advances Corporation if the borrower is already a client of the Corporation, or through the Bank of New Zealand. Loans will be secured by dairy factory orders. Interest will be 4⅛ per cent. on civilian loans, with reduced rates applying to Rehabilitation Department loans. Repayment may be spread over 5 years.

The limit of the loan stands at present at £100, which is to be used to finance the construction of not less than one farrowing unit for each £50 advanced. Applications should be lodged with the local branch of Federated Farmers or the district pig council.

The plans for new building or improvements to existing accommodation must be approved by a representative of Federated Farmers duly nominated for the purpose and the pig council supervisor. In cases where loans are required exceeding the £100 limit and are supported by the approving officers special consideration may be given to them by the Minister of Agriculture. Full particulars are obtainable from branch secretaries of Federated Farmers of New Zealand (Inc.).

STANDARDS OF EFFICIENCY OF PIG PRODUCTION

Standards on Dairy Farms

In an article "Returns from Pig Fattening on Dairy Farms," which was published in the February, 1934, issue of the "Journal," Riddet and McMeekan stated, ". . . the pig plays an important part in determining farm efficiency and it is suggested . . . that no index of butterfat per acre is satisfactory without a complementary statement of pig-flesh per 100lb. butterfat."

Where the system of feeding as outlined at the beginning of this article is adopted the standard of production should be 60lb. of pig meat per 100lb. of butterfat where skim-milk is fed and 30lb. of pig meat per 100lb. of butterfat on whey feeding. With whey the relationship to butterfat production is not always as easily arrived at, as more than the whey from the feeder's own herd is used and the standard may be roughly converted by using 2 gallons of whey as the quantity available for feeding from each 1lb. of butterfat. On this basis 100lb. of pig meat should be produced for each 700 gallons of whey.

In numerous feeding trials carried out by the Waikato Pig Recording Club the standards for food consumption shown in Table 5 were attained in practice under dairy farm conditions with free access to grazing.

TABLE 5—STANDARDS OF FOOD UTILISATION AND SUPPLEMENTING OF SKIM-MILK AND WHEY

Phases of Production	Skim-milk gals.	Meal lb.	Whey gals.	Meal lb.
Dry Sow	200	56	300	84
Per pig to birth ..	29	8	43	12
Birth to weaner ..	89	19	150	28
Weaner to porker ..	171	38	275	56
Porker to baconer ..	432	46	752	56
Total per baconer	721	111	1,220	152
Av. on basis 2 baconers : 1 porker = 120lb carcass	577	96	970	133

(No allowance is made in these figures for the extra food obtained from grazing, particularly for the.)

TABLE 6—FARM REVENUE FROM PIGS PER POUND OF BUTTERFAT

Revenue from pigs as pence per lb. butterfat with meal at

Price of pig meat pence per lb.	£8 per ton Skim-milk	£8 per ton Whey	£14 per ton Skim-milk	£14 per ton Whey	£20 per ton Skim-milk	£20 per ton Whey
3	1.08	.51				
3½	1.32	.63				
4	1.55	.75				
4½	1.79	.87	1.55	.72		
5	2.02	.99	1.78	.84		
5½	2.28	1.11	2.01	.96		
6	2.53	1.24	2.25	1.08	2.01	.92
6½	2.79	1.36	2.48	1.20	2.24	1.04
7	3.04	1.48	2.72	1.32	2.47	1.16
7½	3.30	1.60	2.95	1.44	2.70	1.28
8			3.18	1.56	2.94	1.40
8½			3.42	1.68	3.17	1.52
9					3.41	1.64
9½					3.65	1.76
10					3.90	1.88

Revenue from Dairy By-products

When prices for meals rise farmers too frequently say that meals are too expensive to use for pig feeding. Table 6 not only sets a standard for gross returns less meal costs under various prices for pig meat and meals, but clearly shows that, under the standards of supplementing as shown in Table 5, for each ½d. rise in the price of pig meat the producer has enough revenue to meet a rise in price of meal of about £4 per ton. With higher levels of supplementing, a stage would soon be reached when the revenue would be insufficient to meet the other costs of production, especially when, as at present, these are high.

Table 6 shows the farm revenue from pigs per pound of butterfat according to various prices of pig meat and meals and after deducting the cost of meal used. It is based on the production of pigs averaging 120lb. dressed weight, using 577 gallons of skim-milk, 96lb. of meal or 970 gallons of whey, and 133lb. of meal.

Standards for utilisation of buttermilk in pig feeding may be taken as 35 to 50lb. of pig meat per ton of butter manufactured, depending on the level of supplementary feeding and whether breeding or buying in is practised. A return of 5s. per ton of butter, after allowing for all costs of production except the buttermilk, can be regarded as satisfactory, though some factories who run their own piggeries are able to exceed this. In some cases pedigree pigs are sold, however, and the figure quoted as a standard is for commercial production.

Standards are essential as a measuring stick whereby the keen producer can gauge the degree of success of his operations. Those given in this article should be of value to all producers who aim to ensure that they are as efficient as they should be in their pig production efforts.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during March and for the 8 months ended March 31, 1949, with comparative figures for the same month and 8-monthly period of last season, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

Period	Tons Creamery	Tons Whey	Tons Total	Percentage inc. or dec.	Tons Total in store at end of mth.
March, 1949	13,695	283	13,978	+ 39.139	35,714
March, 1948	9,830	216	10,046	—	40,338
Increase or decrease	+ 3,865	+ 67	+ 3,932	—	— 4,624
For 8 months ended 31/3/49	127,690	2,271	129,961	+ 7.685	—
For 8 months ended 31/3/48	118,602	2,084	120,686	—	—
Increase or decrease	+ 9,088	+ 187	+ 9,275	—	—

CHEESE—

Period	Tons White	Tons Coloured	Tons Total	Percentage inc. or dec.	Tons Total in store at end of mth.
March, 1949	9,308	728	10,036	+23.005	19,320
March, 1948	8,159	—	8,159	—	17,270
Increase or decrease	+ 1,149	+ 728	+ 1,877	—	+ 2,050
For 8 mths. ended 31/3/49 ..	75,736	4,197	79,933	+10.525	—
For 8 mths. ended 31/3/48 ..	72,321	—	72,321	—	—
Increase or decrease	+ 3,415	+ 4,197	+7,612	—	—

If these figures are converted into butterfat equivalent, there is an increase of 8.299 per cent. in butterfat graded for the 8 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Fencing Wire Shortage Overcome

THERE is now enough galvanised fencing wire in New Zealand and in transit to New Zealand to meet all immediate needs, according to a statement made recently by Mr. F. P. Walsh, chairman of the Aid for Britain National Council. Mr. Walsh said that because of the importance of fencing wire in increasing production every effort had been made to obtain supplies wherever possible.

Shortages of other materials such as galvanised water piping, corrugated iron, cement, and reinforcing steel were still restricting farmers' power to produce, but efforts were also being made to overcome these. Knowing the value of farm machinery and of heavy crawler tractors in particular as a means of increasing production, the national council was examining the question of supply with the object of making further representations to the Government if it should be found necessary to obtain more of this equipment from dollar sources.

Vaccination of Sheep for Enterotoxaemia, Blackleg, and "Scabby Mouth"

VACCINES available for the prevention of enterotoxaemia diseases and blackleg and "scabby mouth" of sheep, with details of equipment required for vaccination and technique and method of administration, are described in this article by C. V. Dayus, Livestock Superintendent, Department of Agriculture, Dunedin. Officers of the Department will advise farmers and demonstrate vaccination, but as a good deal of such work must be carried out by the farmer himself, sheep farmers and breeders desirous of reducing disease losses in their flocks are recommended to study the advice in this article carefully.

THE enterotoxaemia diseases of sheep are primarily caused by a bowel infection with organisms of the *Clostridium welchii* group. The causal organism multiplies in the contents of the alimentary tract; whenever this happens toxin is produced, and the subsequent absorption of the toxin causes illness and death. The main sheep diseases under this heading in New Zealand are "pulpy kidney" in lambs, the so-called "braxy-like" disease in hoggets, and on occasions enterotoxaemia in older sheep.

The gas gangrene infections of sheep arise principally through wound infections, frequently by *Clostridium chauveoi*, the organism causing blackleg. Other organisms of this *Clostridium* group may on occasions be implicated.

While blackleg in sheep is fairly widespread in New Zealand, there is hardly sufficient evidence to indicate that it has increased, but it is now known that many of the so-called blood-poisoning losses after shearing, marking, lambing, dipping, etc., are in fact due specifically to blackleg.

The anaerobic group of organisms, to which *Clostridium welchii* and *Clostridium chauveoi* belong, develop best under conditions where oxygen is excluded. Another characteristic is that they belong to the group of spore-forming organisms; that is, in the presence of adverse circumstances they can produce spores. The spore, by virtue of its thick capsule and low water content, is more highly resistant to heat. drying, and disinfectants.

Vaccines

The prime object of vaccination is to raise the animal's resistance to a

---

HEADING PHOTOGRAPH: Vaccination at the side of the brisket with a 20 c.c. record syringe.

disease to a level comparable with that which would follow its recovery from a natural attack. This involves the use of the actual organisms, either living or dead, or their products (toxins) in a fully-active or modified form.

Vaccines, because they actively excite the production of antibodies, are said to effect an **active immunity.** This is developed after an interval of time, the duration of which varies considerably, but is usually about one or two weeks. Active immunity when once induced may persist for a long time, even throughout the life of the animal.

The blood serum of animals which have been actively immunised is rich in antibodies. This serum can be injected into another susceptible animal and **passive immunity** is thus induced. This type of immunity is immediately established, but, unlike active immunity, it is transient, and lasts perhaps only 10 to 14 days.

Vaccination for Enterotoxaemia

Active immunisation of sheep by the inoculation of *Clostridium welchii* type D vaccine is carried out:—

1. For the protection of young lambs against "pulpy kidney" by colostral antibody after immunisation of the ewe. The lamb cannot be actively immunised to protect it during its most susceptible period, from 3 to 6 weeks of age. Immunisation in this way is of no value in early life. The ewe is therefore actively immunised so that the lamb will receive some degree of passive immunity through the medium of the colostrum (first milk) of its mother.

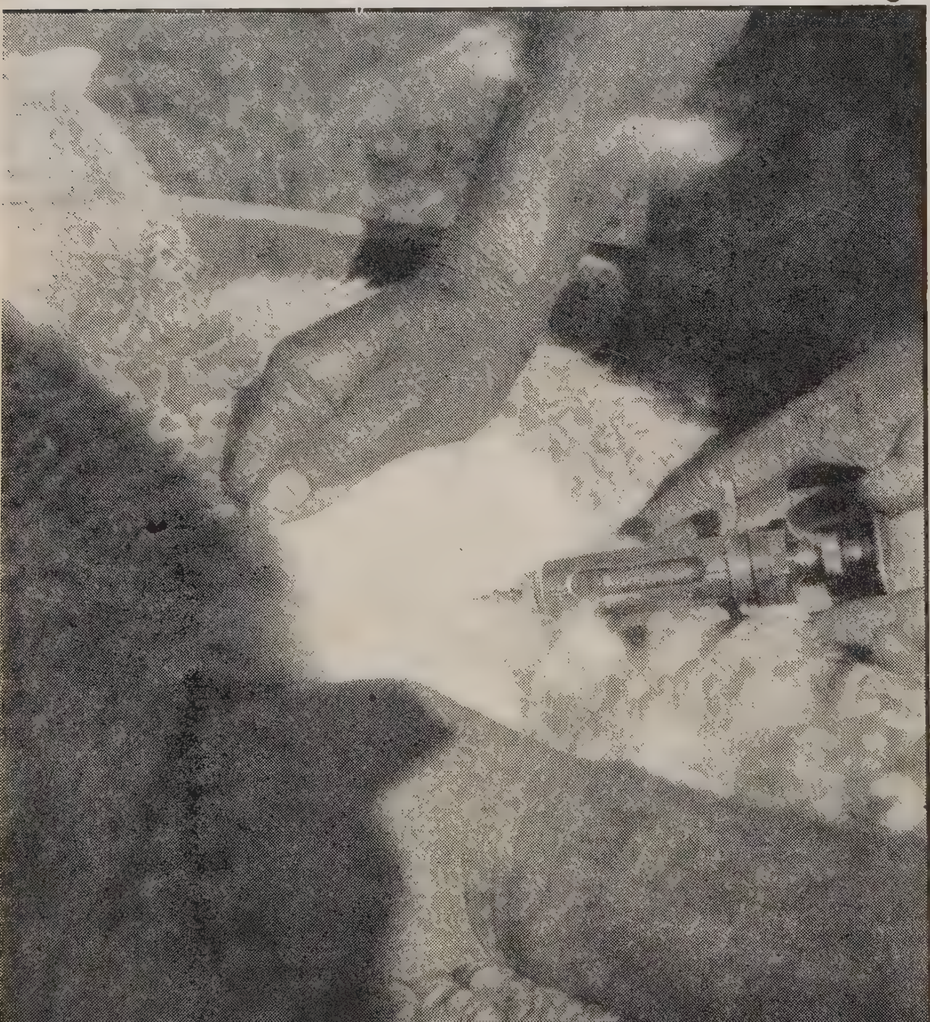
For this purpose two inoculations are given to the ewe, the first of 5 c.c. in the autumn and the second of 10 c.c. about 10 days before lambing.

The primary inoculation stimulates the production of some antibodies and the second inoculation, acting on the sensitised animal, stimulates an immunity response and antibodies appear both in the blood and the colostrum.

In succeeding seasons immunised ewes need only be revaccinated once each season with a single inoculation of 10 c.c. given about 10 days before lambing.

2. When protection is desired in older sheep, for example, for the protection of hoggets in the case of the so-called braxy-like disease, vaccination must be carried out with the purpose of inducing active immunity. This is done by the injection of a single dose of 5 c.c. of *Clostridium welchii* type D vaccine.

If there is a high death-rate, it is more advisable to vaccinate the animals twice with an interval of not less than 14 days between. The dose each time is 5 c.c. March and April are convenient months for vaccination. (N.B.: The dose rates are shown in cubic centimetres and refer to the vaccine prepared and supplied by the Commonwealth Serum Laboratories, Melbourne.)



Vaccination against Blackleg

An increasing number of sheep are being vaccinated against blackleg. Where the circumstances justify the procedure vaccination has proved effectual in the prevention of infection.

The vaccine is supplied by the Department of Agriculture's Animal Research Station, Wallaceville, and up to the present has been used at a dose rate of 2 c.c.

Technique of Vaccination

Officers of the Department will give advice on the technique of vaccination and suitable demonstrations. As it is impossible, however, for them to undertake all the work, a good deal must be carried out by the farmer.

The method is not as involved as it may at first appear. The main thing is to be fully acquainted with the principles involved and to adopt a sensible system in putting these into effect. If this is done and reasonable precautions are taken, it is surprising the progress that can be obtained, so that the work is not drawn out unnecessarily.

The importance of such precautions will be understood at once when it is realised that the spores of such anaerobic organisms (the cause of enterotoxaemia, blackleg, and tetanus, and the other causes of so-called blood poisoning) are normally present in the soil, with the result that concentration is likely to be greater in the vicinity of sheepyards, dips, etc. Spores may even be present in the wool or on the skin of sheep.

If the right approach is not made, there is a danger not only of abscess formation at the site of injection, but of introducing spores and thus possibly infecting sheep at the time of vaccination.

The vaccine when it is received has been tested to ensure that it is sterile. The containers should be well shaken during use to ensure thorough mixing.

The rubber stoppers should not be removed until just before withdrawal of the contents. Vaccination should begin immediately after opening the container.

All containers which have been opened should be used at the one operation only, and any residue left in an opened container should be thrown away.

Equipment Required

Alongside the operator on a clean surface protected from wind and dust a place should be provided for:—

1. Vaccine;
2. Basin, clean water, and antiseptic for washing operator's hands;
3. Cottonwool;
4. Small bowl with methylated spirit;

AT LEFT: **Vaccination behind the shoulder with a 20 c.c. syringe. The wool has been parted and the skin lifted slightly, ready for the needle to be inserted subcutaneously with a light thrust.**

The most suitable place to handle ewes for vaccination is in a drafting race into which the sheep are run without unnecessarily crushing them. With the materials required placed conveniently just outside the race, the operator and his assistant can work along the whole race, leaning over from the outside.

5. Small spirit stove and enamel basin for boiling syringes and needles;
6. Small container with cover for vaccine to facilitate the filling of syringes;
7. Syringes; the best hypodermic syringe is one of the record type of 20 c.c. or 25 c.c. capacity, of which there are several suitable makes available;
8. Needles; 10 or 12 hollow needles 1in. to 1¼in. long, gauge 18 with long bevel, are required. Record fitting or Luer lock fitting should be used if the syringe is adapted accordingly.

(N.B.: There are several types of automatic injecting appliances and self-filling gadgets for use with standard hypodermic syringes on the market, but use of these types of apparatus necessitates additional precautions in sterilisation and handling.)

Sterilisation

The only way of sterlising syringes and needles is by boiling them. To do this the syringes should be taken apart, placed in cold water, brought to the boil, and boiled for at least 10 to 15 minutes.

To avoid breakages:—

1. Do not sterilise syringes with the plungers inserted;
2. Do not plunge syringes into boiling water;
3. Do not assemble syringes until they are cool.

It is easy to keep a small patent stove going during the operation so that needles can be kept sterilised and the needle in use changed frequently. A fresh needle should be used after vaccinating every 10 to 12 sheep and after each refill of the vaccine container.

The vaccine container and cover should be boiled at the start of the day's work and thereafter at suitable intervals as many times as required.

Removal of Vaccine from Bottle

If the vaccine is in a rubber-corked bottle such as is used for *Clostridium welchii* type D vaccine, the bottle should be well shaken. Swab the cork and neck of the bottle with methylated spirit before removing the rubber stopper. Pour part of the vaccine into the container and replace the cork in the bottle. Proceed to use up contents of the container.

If it is a rubber piercing stopper, the vaccine container is not required. Insert a sterile needle through the rubber cap and leave it there, filling the syringe as required from this needle.

Site of Inoculation

There are at least three sites which may be conveniently used for inoculation:—

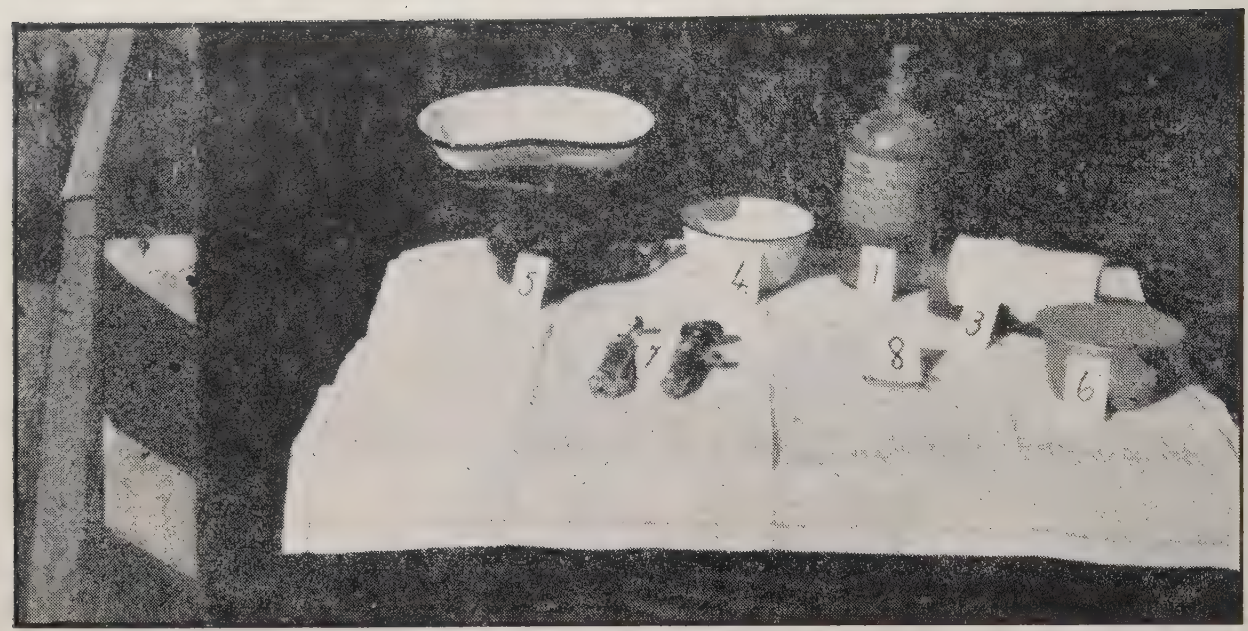
1. Behind the shoulder;
2. The side of the brisket;
3. Inside the thigh.

The first site is suitable for vaccinating ewes with *Clostridium welchii* type D vaccine.

The most suitable place to handle ewes for vaccination is in a drafting race, into which the ewes are run, filling the race without unnecessarily crushing the sheep. Vaccination is then begun and the operator and his assistant work along the whole race, leaning over from outside the race.

The site behind the shoulder allows minimum handling of the ewes. The wool is opened up by the assistant to expose the injection site for the operator. A clean area of the skin is chosen. At one time it was suggested that the skin area should be swabbed with methylated spirit, but it is impossible to sterilise the skin in this manner and the spores of anaerobic organisms cannot be destroyed by methylated spirit. The skin should therefore be left in its natural state. There is a disadvantage in having it wet just before injection, as this tends to facilitate seepage from the skin into the small puncture type of wound. (N.B.: For the same reason vaccination should be carried out on a dry day and with the sheep dry.)

The skin site having been exposed, the needle is inserted obliquely, with a sharp thrust, just through the skin into the subcutaneous area. As there is a disadvantage in inserting the needle deeper or wounding the deeper



Appliances required for vaccination arranged conveniently and with due regard to hygienic operation on an improvised stand beside the race. From left: Boiling bowl for sterilisation of syringes and needles (5), syringes (7), bowl for methylated spirit (4), vaccine (1), needles (8), cottonwool (3), and vaccine container (6).

tissues, on no account should the needle be used as a dagger for indiscriminate stabbing. That is one objection to the very short needle. Another is that the butt of the short needle has been in contact with wool, etc., and cannot fail to come in contact with the outer opening of the punctured wounds. The insertion of the needle must be looked upon as a simple but at the same time delicate operation.

When the hollow needle has been inserted the requisite dose of vaccine is discharged into the subcutaneous area by light pressure on the plunger of the syringe.

Alum-precipitated Vaccine

The alum-precipitated vaccines cause a lump at the site of injection. This gradually disappears, although even after 3 or 4 months a small nodule will be present in the majority of vaccinated sheep.

When the vaccine is injected under the skin in any of the sites already mentioned it is possible that blemishes will occur in the dressed carcass. The alum-precipitated vaccine is therefore **not** recommended for injection at these sites in lambs destined for export. The longer the interval between vaccination and slaughter the greater will be the likelihood of such blemishes having disappeared.

There are two alternatives in vaccinating lambs for export:—

(a) The vaccine may be injected under the loose skin inside the knee;

(b) Formalinised cultures of the vaccine which contain no alum may be used.

Vaccination against "Scabby Mouth"

Vaccination against "scabby mouth" is rather different from the other two vaccinations described.

"Scabby mouth," which is more properly known as contagious ecthyma, is a specific contagious-infectious disease of sheep which occurs principally in young sheep, but is often seen in a milder form in adult animals. It is characterised by the formation of papules, vesicles, pustules, and scabs on the skin of the lips. It is a virus infection and a high degree of immunity follows natural infection. Vaccination is practical and dependable. Lambs can be done quite easily at marking time.

Vaccine

The vaccine is prepared at the Department of Agriculture's Animal Research Station, Wallaceville. From cases occurring naturally a scab emulsion is made consisting of approximately 1 part desiccated scab material to 100 parts of an equal mixture of sterile normal saline and sterile glycerine.

Technique

The site of vaccination is the bare skin inside the thigh. This should be cleansed with ether, which is an excellent solvent for the natural grease. Several small superficial scratches are made in the skin with the sharp point of a hypodermic needle. Scarify the skin lightly, merely breaking through the superficial layer. In doing this it is unnecessary and undesirable to draw blood. The area scarified should not exceed ¼in. square. If the scarifications are too large or too numerous, the resultant "takes" will be unduly severe. A drop of the scab emulsion is then introduced to the scarified area by a small, stiff-bristled brush.

Within 72 hours an excellent "take" will be noticed, with lesions simulating those which occur naturally. The reaction affords a very good degree of immunity, which probably lasts 15 to 30 months, thus protecting animals through the susceptible age.

JOURNAL OF THE BRITISH GRASSLAND SOCIETY

The Journal has been instituted as a medium for the publication of the results of research and practical experience in the realm of Grassland Husbandry.

CONTENTS OF VOL. 3, No. 4, 1948:

1. Pasture herbage as a causal factor in animal diseases: A Review. W. R. Muir.
2. Studies on the biochemistry of pasture plants. 2. The pharmacological properties of certain pasture plant juices and their possible significance in the aetiology of some disorders of the grazing animal. E. T. Rees Evans and W. Charles Evans.
3. An experiment to test the influence of date and depth of sowing on four of the chief grasses and on white clover. Sir R. George Stapledon and Dorothy E. Wheeler.
4. Grassland in the East of Scotland. R. G. Heddle.
5. The control of rushes on newly reseeded land in Yorkshire. H. I. Moore and S. Burr.
6. British Grassland—Present Problems.
7. Research and Problems Overseas.
8. Reports and Notices of Meetings.
9. Book Reviews.

This Journal is published quarterly. Subscription: Vol. 1, 10s.; Annual subscription thereafter 20s. Orders to Secretary, British Grassland Society, Agricultural Research Building, Penglais, Aberystwyth, Wales.

HEADING PHOTOGRAPH: A general view of a well-managed vineyard.

NUTRITION OF THE GRAPEVINE

AN understanding of the processes involved in the growth of the grapevine and the means by which favourable conditions can be promoted is essential if consistently-good yields are to be obtained. This article by F. Berry Smith, Viticulturist, Department of Agriculture, Auckland, deals briefly with the scientific explanation of vine and fruit growth and explains how the facts are related to cultural practices which will ensure that vines receive the nutrients necessary for vigorous growth.

THE grapevine like all green plants with a root system extracts the elements required for growth from the atmosphere and the soil. The gases used from the air are carbon dioxide and oxygen and are taken into the plant through minute pores in the leaves. The carbon dioxide by a remarkable process known as photosynthesis combines with water to form a sugar called dextrose, oxygen being liberated in the reaction. This synthesis is made possible by the activity of the green colouring matter, or chlorophyll granules, when stimulated by sunlight. The soluble sugar so formed serves as a food and, dissolved in the sap, is transported to all the growing parts. This sugar can be converted into cellulose, for building the woody structure and foliage, or into starch, in which form it is stored as reserve food in the canes. When sugar is required for nourishment (such as when the vine becomes active after the dormant period) the stored starch is converted back to sugar by means of substances called enzymes.

By using atmospheric oxygen the vine oxidises sugar to form tartaric and malic acid, the chief acids found in the grape. The pigments of red and black grapes are formed in the colourless state in the leaves and are conducted to the berries, where they assume colour by oxidation or combination with oxygen, which requires heat. The leaf of the vine is therefore the vital centre in which all the chemical substances which enter into the formation of the vine and its fruit are elaborated.

Photosynthesis, also called carbon assimilation because in this manner the element carbon is obtained, can take place only in the presence of light and the process is accelerated by heat, reaching a maximum at about 98 degrees F.

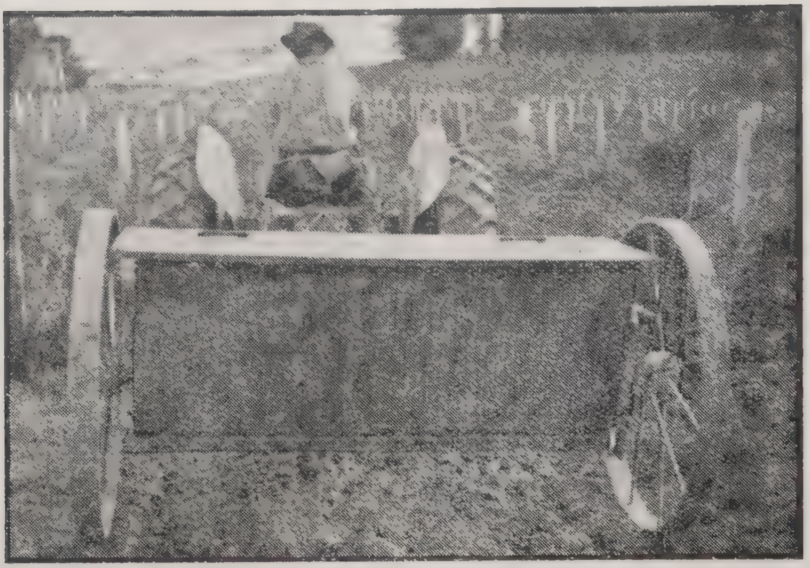
From this simplified scientific discussion of the factors involved in the nutrition of the vine in relation to its atmospheric surroundings it is possible to arrive at valuable practical conclusions.

1. To promote all the vital processes of the vine it should be trained so that as much of the foliage as possible is displayed to the light. A sunny northerly aspect is very beneficial in the attainment of maximum light and heat. If the foliage is congested, much of it will be shaded from the light and heat.

2. As sugar is formed in the leaves preparatory to being conducted to the fruit, too drastic thinning of the vine would prevent adequate ripening of the fruit.

3. As the colouring of the fruit is an oxidation reaction which requires heat, the fruit should hang free of the foliage to derive all the heat possible from the sun. For proper ripening of the fruit heat and not light, as is popularly supposed, is required. To improve the colouring of grapes, particularly in the colder parts of the Dominion, it is advisable to expose the fruit by removal of some of the over-growing foliage.

MOST NECESSARY ELEMENTS



A machine for sowing cover crops and manures.

4. Because of the higher temperatures near the soil, grapes will colour and ripen somewhat better when trained close to the ground, but the disadvantage of applying this practice to fullest extent to table grapes is that the fruit is disfigured by mud splashed up by rain.

Elements Taken from Soil

Of the substances which the vine takes from the soil the elements removed in greatest quantity are nitrogen, potassium, and phosphorus. In manurial terminology phosphorus is expressed as phosphoric acid and potassium as potash. Small quantities of calcium are required for nutrition and very minute amounts of magnesium, manganese, iron, sodium, sulphur, chlorine, silicon, boron, and zinc, which are called trace elements, are essential for normal growth. In most soils there is an ample supply of the trace elements and manurial practice consists of replenishing the nitrogen, phosphoric acid, and potash used by the vine and removed annually from the vineyard by cropping.

Manuring

It is not possible to recommend a general manurial programme which will exactly suit all conditions, but a useful guide in the case of a vineyard producing 3 to 4 tons of grapes per acre is to apply 5cwt. of superphosphate, 1½cwt. of sulphate of potash, and, if necessary, up to 1½cwt. of sulphate of ammonia per acre or the equivalent in other fertilisers. In addition, it is usually necessary to make an annual application of lime at the rate of 5cwt. per acre. To maintain essential humus green manuring is vitally important. For vines trained on the overhead trellis or arched pergola, which are capable of carrying crops in the vicinity of 10 tons per acre, the quantities of manure should at least be doubled, with the exception of lime. As vines are selective feeders and will not use more phosphoric acid and potash than they require, a dressing of these fertilisers somewhat above basic requirements is advantageous to ensure that vines are adequately supplied. The quantities already recommended are greater than the actual amounts removed by the vines in the formation of wood, foliage, and fruit, as allowance has to be made for losses by leaching and the conversion in the soil of part of the manure into unavailable forms.

It is necessary to be more circumspect about the rate of application of nitrogenous fertilisers, as vines will use amounts of nitrogen out of all proportion to their requirements. Excess nitrogen results in rank growth, which makes the plant very susceptible to disease, at the expense of the quantity and quality of the fruit. However, the type of growth produced by excess nitrogen should not be mistaken for strong growth under favourable conditions. Vines growing strongly as a result of good, balanced nutrition and ample moisture will also exhibit an inability to produce good crops, if, by close planting on a low trellis, growth is restricted. Vigorously-growing vines—vines that have a large development of wood and foliage—will require a lot of pruning if they are to be made to conform to the restricted area available on a low trellis, and hard pruning always means a reduction in fruit. If the same vines are given greater scope for their exuberance by training them on an overhead trellis or arched pergola, they will fruit abundantly. Growth is likely to become rank on rich soils with a high humus content and where this occurs nitrogenous fertilisers should not be applied nor should green manuring be practised for some time or until surplus nitrogen is exploited. In soils with a low humus content such as heavy clay and light sandy soils nitrogen deficiency will exist and suitable applications of nitrogen are necessary for proper development.

The use of sulphate of ammonia has the undesirable effect of raising the acidity of the soil with the result that phosphoric acid may be rendered unavailable and the useful activity of earthworms decreased. Nitrate of soda, another form of nitrogen, has a bad effect on the mechanical condition of heavy soils by deflocculating the soil particles and rendering them very sticky and difficult to cultivate.

Cover Cropping

Cover cropping with blue lupins will impart an appreciable amount of nitrogen to the soil by the activity of bacterial colonies on the roots. which secure nitrogen from the air.

To increase the nitrogen content of the soil it is preferable and safer to apply 5cwt. of dried blood and 5cwt. of bone manure with a cover crop of blue lupins, which are sown at the rate of about 90lb. to the acre. Dried blood is a nitrogenous manure containing 9 to 14 per cent. of nitrogen, compared with 20 per cent. in sulphate of ammonia.

Where a crop of lupins is to be grown the vineyard should be cultivated during the first week in March to produce a good seed-bed and the cover crop and manures sown. A machine suitable for the purpose is shown on this page. The overall width is 6ft., leaving ample room to pass along 10ft. and 8ft. rows. An important feature of the machine is an absence of revolving cogs in the distributing mechanism, which prevents the seeds from being mangled.

A successful winter cover crop can be achieved only by sowing before soil temperatures are too low, and unless the crop is in before the end of March a poor stand of greatly-reduced value will result. If for some reason it is not possible to sow a cover crop, volunteer weed growth may be topdressed in the autumn as for lupins and this will contribute valuable organic matter to the soil. The cover crop should be turned in (a disc harrow or rotary hoe is ideal for this work) at the flowering stage or in early September and the operation followed by an application of 5cwt. of lime and 1½cwt. of sulphate of potash, which will complete the manurial programme.

A cover crop when turned under may temporarily depress the available nitrogen supply in the soil until decomposition proceeds and for that reason it is advisable to have the crop down a few weeks prior to bud burst so that the vines will not suffer from temporary nitrogen deficiency in the early stages. Prunings may be left on the vineyard and smashed up into small pieces by the discs or rotary hoe when the cover crop is being cultivated into the soil. The accompanying green matter will aid in the disintegration of the prunings in the soil. Where the vines are displaying sufficient vigour no nitrogen in addition to that imparted by the cover crop should be applied and the lupins should be sown with 5cwt. of superphosphate or bonedust only. Basic slag is an excellent phosphatic fertiliser for the vineyard and may be used in place of superphosphate or bonedust. It is preferable to use the three fertilisers in rotation.

As a general practice the application of phosphatic fertiliser with the cover crop and of potash and lime when the crop has been turned in in the early spring is recommended.

Functions of Plant Foods

Nitrogen is the nutrient which all plants need to grow leaf and wood. An ample supply of nitrogen promotes rapid growth of vine, characterised by an extensive area of dark green leaves and thick canes. Where a deficiency of nitrogen exists, growth is slow and weak and the leaves have a sickly, yellowish-green appearance. Excessive nitrogen has the bad effect of diverting most of the energy of the vine to producing wood and foliage and as a result the fruiting is impaired.

Phosphoric acid stimulates root development and for this reason a liberal dressing of phosphatic manure is particularly desirable for young vines. It encourages fertility and the setting of fruit and promotes early ripening. Liberal dressings of phosphate appreciably enhance the quality and sweetness of grapes and this is reflected in the improved quality of the wine made from them.

Potash promotes the ability of the plant to form carbohydrates (starches, sugars). It is the predominant stimulator of ripening of fruit and wood. It imparts strength and long life to vines and builds up resistance against pest and disease attack. Potash deficiency is revealed by flimsy, dull, anaemic leaves, badly-filled bunches of improperly-coloured fruit, or spongy wood lacking substance. The acidity of the grapes is reduced by neutralisation of the acids with potash absorbed from the soil as maturation proceeds. Considerable amounts of potash are also retained in the canes, so there is a steady and progressive depletion of the soil's reserves, which must be replenished sooner or later to maintain healthy growth. On potash-starved soils growth response to additions of potassic fertiliser is slow and investigations have shown that it may take heavy doses for three seasons to achieve results.

Lime, apart from being an essential plant nutrient, improves the mechanical condition of the soil and renders other plant foods available by displacing them from combinations in the soil. It also neutralises organic acids formed in the soil by decomposition of plant growth. If the soil becomes too acid, phosphoric acid ceases to be available and toxic elements like aluminium become more easily available. However, the excessive use of lime will make the soil reaction alkaline and certain trace elements such as manganese, iron, zinc, and boron, which are all very essential to the vine, will become entirely unavailable.

The pH (a measure for the intensity of the acid reaction of the soil) should be 6.0 to 6.5 and the exact lime requirement is the amount of lime needed to adjust the pH accordingly. This can be determined precisely only by a trained scientific worker with special equipment.

A vineyard under a cover crop of lupins.

It should be appreciated that the correct use of fertilisers is an exacting business and careful scientific application is necessary to achieve and maintain maximum soil fertility.

Green manuring supplies humus and where leguminous crops such as lupins, beans, and peas are grown they may contribute as much as 80 to 100lb. of nitrogen, the equivalent of 4 to 5cwt. of sulphate of ammonia, to the soil. Though the humus resulting from green manuring makes a valuable contribution to the soil, it should be realised that the contribution is comparatively small and hardly more than sufficient to maintain the existing humus content of the soil. It is a misapprehension to suppose that an impoverished soil can be rendered fertile with humus derived from green manuring alone, as the small gain does little more than compensate for the continuous depletion occurring under cultivation. The only way materially to improve the humus content of an impoverished soil is by heavy dressings (10 tons to the acre) of farmyard manure or compost.

In addition to removing considerable quantities of water from the soil in winter and helping to counteract waterlogging, good green crops absorb soil nutrients during growth and reduce losses caused by leaching. The salvaged plant foods are returned to the soil when the green crop is turned in and become available to the vines.

A crop such as lupins, which have a vigorous, penetrating root system, tends to break up consolidated layers of soil and improve drainage.

Trace Elements

Instances of abnormal growth due to a deficiency of trace elements are rare.

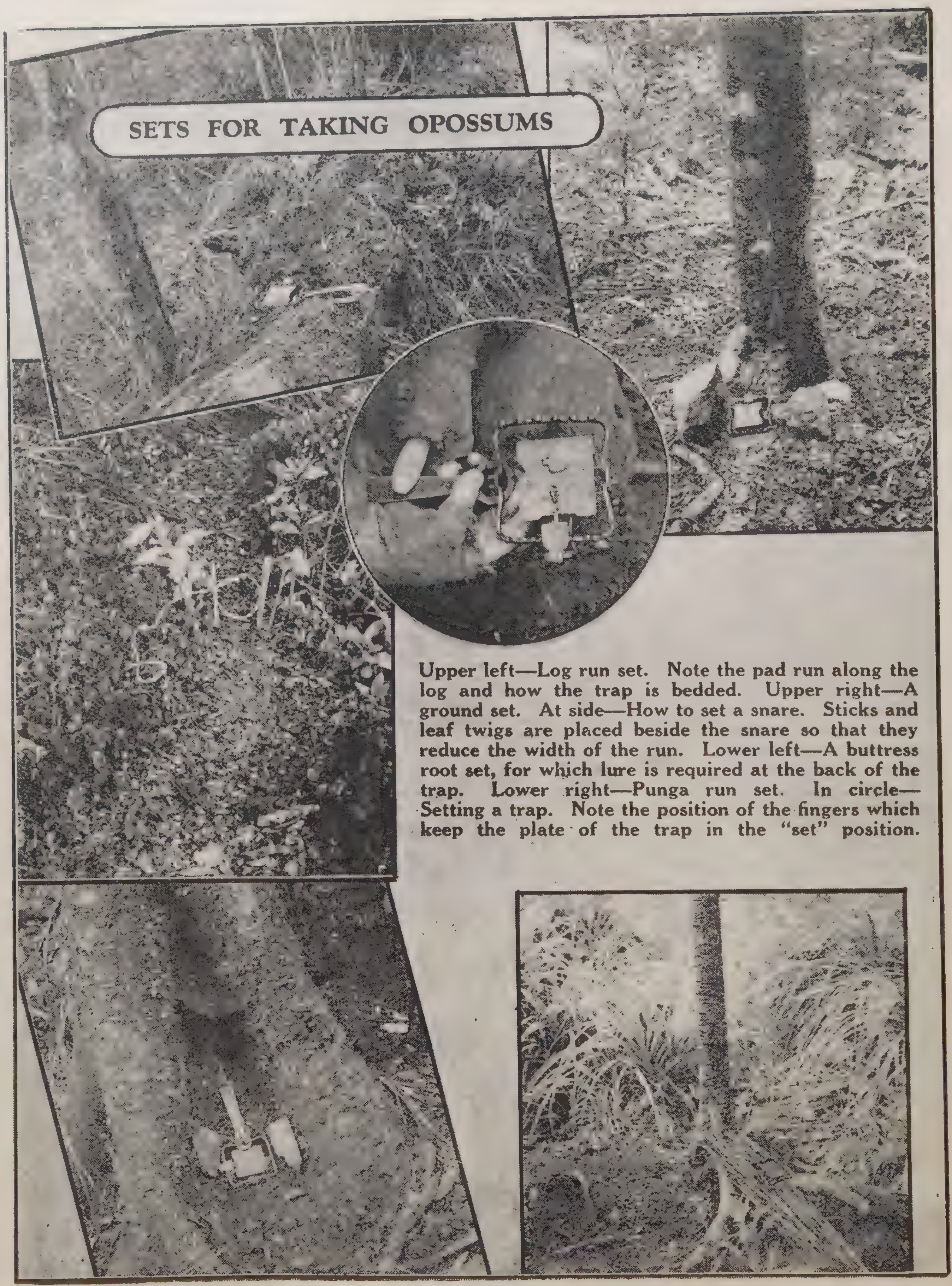
Boron: In the South Island a case of unhealthy vine growth concurrent with fruit that was not uniform in size and developed a rot was investigated by the Cawthron Institute and proved to be due to boron deficiency. This was successfully remedied by the addition of borax at the rate of 2oz. per vine every 5 years. Overseas reports have referred to the condition as "hen and chickens" and describe one of the symptoms to be bunches in which part or whole consists of undersized, seedless berries. A spray consisting of 4lb. of borax per 80 gallons of water, applied 2 to 3 weeks before blossoming, is an alternative treatment.

Zinc: Stunted vines in parts of South Australia were found to be suffering from zinc deficiency. As a corrective measure the pruning cuts were painted with a zinc sulphate solution (1½lb. of zinc sulphate to 1 gallon of water). A condition in fruit trees termed "little leaf" and in citrus "mottle leaf" is caused by a lack or unavailability of zinc in the soil and is corrected by using a zinc sulphate spray (5lb. of zinc sulphate and 2½lb. of hydrated lime per 100 gallons of water).

Iron: On soils with a high lime content iron is rendered insoluble by the alkaline reaction and vines growing there will suffer from a physiological disease, typified by a yellowish-green to yellow colour of the leaves, called chlorosis. On French vineyards this trouble was remedied by applying a strong solution of iron sulphate immediately after pruning. The action is explained by the fact that the sap pressure of the vine progressively falls in autumn and when it starts to recede the pressure becomes negative so that any liquid swabbed on to cut surfaces made by pruning will be absorbed into the body of the vine. Symptoms similar to those of chlorosis are produced by wet and badly-ventilated soils and also, as previously mentioned, by a lack of potash or nitrogen.

A deficiency of other trace elements could cause abnormal growth, but there is little on record of sufficient importance to warrant comment.

SETS FOR TAKING OPOSSUMS



Upper left—Log run set. Note the pad run along the log and how the trap is bedded. Upper right—A ground set. At side—How to set a snare. Sticks and leaf twigs are placed beside the snare so that they reduce the width of the run. Lower left—A buttress root set, for which lure is required at the back of the trap. Lower right—Punga run set. In circle—Setting a trap. Note the position of the fingers which keep the plate of the trap in the "set" position.

[Ministry of Works photos.

Trapping of Opossums and Care of Skins

TRAPPING of opossums can be not only a profitable undertaking, but also can assist in the control of what has, in several farming districts, become a serious pest. There are, no doubt, many young men who could do this work at least part time, but who lack the necessary knowledge. This second article, by L. T. Pracy, Field Officer, and R. I. Kean, Biologist, of the Wildlife Branch, Department of Internal Affairs, explains trapping methods, general control measures, skinning procedure, and care of skins. Information concerning the general habits of opossums, on which a trapper must be well informed, was contained in an article in last month's "Journal."

[Ministry of Works photo.

THE Opossum Regulations 1947 permit the taking of opossums without licence at any time, without restriction, except as to methods of capture, but they confer no right of entry on to property.

Except in defined special areas where any means not involving unnecessary cruelty may be used, methods of taking are limited to:

1. The normal type of jawed trap, set so that it can fall to the ground when sprung.
2. Snares set so that the head of the animal will pass through the noose.
3. Shooting.

Traps and snares must be visited at least once daily.

A further provision in the regulations prohibits liberation of opossums in any part of New Zealand, and it is illegal for them to be kept in captivity.

The use of poison for killing opossums is illegal except in prescribed areas where compliance with the requirements of Section 16 of the Police Offences Act is necessary.

Trapping

Trapping can be done at any season of the year, though as explained later in this article the spring change of coat period is best avoided. Winter skins are heavier, but summer trapping is profitable in some areas.

Permission to take opossums must first be obtained from the owner or controlling authority of the land concerned. If a block in a State forest is being considered, application should be made to the Conservator of Forests at Auckland, Rotorua, Palmerston North, Nelson, Hokitika, Christchurch, or Invercargill.

Opossum Sign

Before trapping is begun it is advisable to survey a proposed trapping area for opossum sign or damage. Recent claw marks on trees, fresh bark biting, both fresh and old droppings, and "runs" or tracks. The trapper should also look for food trees and examine them carefully for signs of defoliation. A further test of the area can be made by using a few traps to determine whether commercial trapping is warranted. Opportunity should be taken at this time to select a camp site, which should be in a dry, sunny position situated near the centre of the block so that there is no unnecessary walking and carrying. An ample supply of firewood for drying skins is also essential, and some consideration should be given to suitable means of working the block.

Equipment and Camp

Before operations begin, give consideration to the selection of equipment. If a hut is not available and tentage is needed, a tent 16ft. x 12ft. x 6ft. with fly to suit has been found most suitable. The tent is erected and laid out as shown in the diagrams on the next page. A strong framework is necessary not only to support the tent and fly, but also to support the combined weights of skin boards or frames, skins on airing lines, and skins in bundles for final airing, because skins have to be dried under cover in camp. The tent requires to be draughtproof to keep the heat in when drying and airing skins and a large fireplace is necessary, especially in bush areas and in colder climates. The frame for holding skin-drying boards is in front of the fireplace. It should be built high enough to allow head room below when the skin boards are in position.

A list of equipment required for an experienced two-man party is as follows:—

Tent: 16ft. x 12ft. x 6ft.
Tent fly: 18ft. x 14ft. 6in.
Traps: 200—250.
Boards (36in. x 10in. x ¾in.): 45—50.
Staples: 1¼in.—300; ¾in.—100.
Full axes: 2.
Hand slashers: 2.
Tomahawk: 1.
Hammers: Claw—2; pegging—2.
Maul: 1
Wedges: 3
Saws: Crosscut—1; handsaw—1.
Nails: 2in.—2lb.; 3in.—2lb.; 4in—4lb.; 1¼in. (box nails for pegging)—5lb.
Flat tins for pegging nails: 2.
Kerosene boxes for pegging: 4
4-gallon tin for mixing "dope."
"Dope" tins (1lb.) with lids.
Chaff sacks: 6.
Camp ovens: 2.
Water buckets.
Heavy string or cord for airing lines and for hanging opossums on trap line: 1 ball.
Rope (clothes line) for bundling skins.

Fewer traps and boards may be required by inexperienced men, but inexperienced men with initiative, who are prepared to learn, may, in a very short time, equal older trappers in performance. The amount of equipment which can be taken depends upon the accessibility of the trapping area. If pack horses or other means of transport are available, boards should be used, though frames are more suitable where trappers have to carry equipment and food. Generally, board pegging is to be preferred and the equipment and methods which will be describbed are designed to cover this system of skin drying, though other methods will be discussed.

If traps are roped, that is, tied to trap sets with rope or sash cord instead of being stapled, staples can be omitted from the equipment list. The frame pack has many advantages for carrying traps.

Working the Country

The trapper at this stage will have some knowledge of the terrain and the most suitable ridges and leading spurs to set. Whenever possible trap lines should be set up leading spurs, along ridges, and down adjoining spurs so that they produce a continuous series, but the setting of trap lines in this manner depends largely on the type of area. Dead-end trap lines should be avoided so that steps do not have to be retraced.

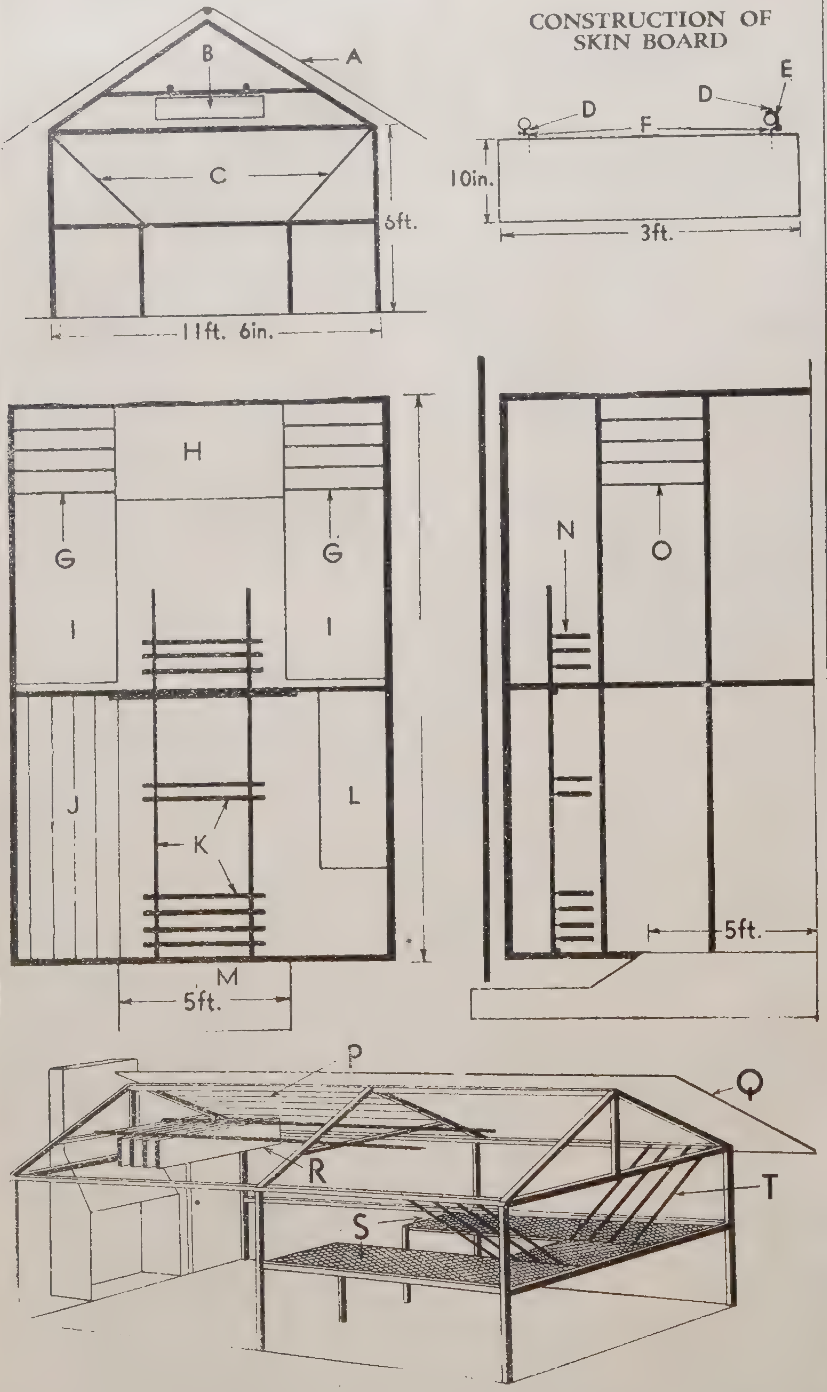
To maintain essential population control, an effort should be made to cover all portions of a trapping block.

Types of Set

Success in trapping depends largely upon making full use of the natural features of the area. No one type of set can fulfil all requirements, so descriptions of the main types of sets are given here, with particulars of the situations for which they are best suited.

Punga run set: This set prevents ground birds—kiwis and wekas—from being caught provided it is set at a steeper angle than is shown in the illustration on page 468. It should always be used in districts where there are kiwis and wekas. When a

LAYOUT OF TRAPPERS' CAMP WHERE TENTAGE IS REQUIRED



A—Tent fly. B—Skin boards. C—Battens. D—Staples. E—Rope loop through staple. F—3in. nails driven in and bent. G—Battens. H—Bunk for stacking skins. I—Bunks. J—Airing lines. K—Skin boards and frame. L—Table and cupboard. M—Fireplace. N—Skin boards and frame. O—Battens. P—Airing lines. Q—Tent fly. R—Skin boards and frame. S—Bunks. T—Bunk for stacking skins.

set of this type is required it is not necessary for pungas or tree ferns to be cut—logs or dead pungas should be used. The run must be placed firmly against a tree with the lower end bedded slightly in the ground so that it can be jammed down hard against the tree.

Log or pad run set: This type of set can be used on a fallen log or on a pad run on the ground. A space should be cut into the log in which the trap can sit. If a trap is set on the ground on a pad run, the jaws should be bedded flush with the level of the ground, and it can be tied or stapled to a root or to a handy tree.

Ground set: This is a commonly-used type of set, which is quick and easy to set. If stones are not available in the area, trimmed fronds of tree ferns or sticks 8 to 9in. long can be stuck loosely in the ground to make a run-in.

Buttress root set: This is a common set in heavy bush country.

Baits and Lures

It is generally possible for a trap to be located so that an opossum will encounter it and be caught in the course of its normal activities. However, attraction to a set may be necessary in featureless country, and even in normal situations baits or lures will improve the catch by drawing animals from a distance by smell or sight.

A number of foods and materials has been tested as baits in the field, but oil of aniseed in dry flour was found to be so much more effective than other substances that the use of that mixture alone is recommended.

The bait is prepared in quantity (4 months' supply) as follows:

Materials: 1 4-gallon tin with an air-tight, press-on lid, 2 small (1lb.) tins with lids, 50lb. of flour, 16oz. oil of aniseed.

Method: Spread an even, ½in. layer of dry flour on the bottom of the large tin, sprinkle the flour with aniseed, and repeat the procedure until the tin is filled. Close the tin and leave it for 1 or 2 days; then stir the contents and leave it for a further day before use.

Use: A 14oz. baking powder tin holds sufficient for 50 traps. About one teaspoon of the bait is pinched up in the fingers and thrown at the back of the trap. A small trail of the lure can be sprinkled on the ground leading into the trap, but none should be placed on the plate or jaws.

Considerable numbers of rats are commonly found in opossum country; like opossums, they are drawn to traps by aniseed and flour. Some trappers do not use artificial lures as they feel that the greater number of opossums caught is more than offset by the number of traps put out of action by catching rats. This question is influenced largely by trapping methods—location of the lines and the setting of traps. When the trapper is in doubt he should try both methods simultaneously and compare the results. The drawing power of aniseed varies according to the nature of the country, the wind direction, and the climate generally. Under favourable conditions the indications are that opossums may be attracted from a distance of 200yds. Experimental work included both the comparison of baited with unbaited traps and the retrapping of earmarked opossums which had been caught and released.

Perhaps the most convincing demonstration was that given by two experimental trap lines (A and B). These were set along the crests of two similar parallel ridges, the distance between the lines varying from 100 to 200yds. The direction of the prevailing wind was from A to B. Line A was trapped using aniseed for 16 nights (8 wet nights), resulting in 98 opossums and 13 rats being taken. Line B was then trapped for 3 nights with negative results, though signs showed that opossums had occupied this ridge. Undoubtedly line B in its turn would have drawn opossums from the remaining untrapped country, but the time allowed was too short to permit the animals to cross the depleted area.

The experimental block carried a moderate to heavy rat population. A catch of up to 6 rats in the 50 traps used was not unusual. When the number of traps sprung by rats was added to the number of empty ones it was found that the catch was still considered far greater than that which would have been taken without using aniseed.

Much of the rat difficulty experienced by some trappers can be attributed to setting traps too finely, either by deliberate adjustment or by excessive filing off of the edges of the plate catch and tongue bar. A firm (but not stiff) setting gives the best results with opossums. This largely prevents artificial springing of traps whether by rats or from other causes. It must be realised that correct setting and the use of aniseed do not compensate for faulty general technique. They are only two of the points which require meticulous attention.

Setting Traps

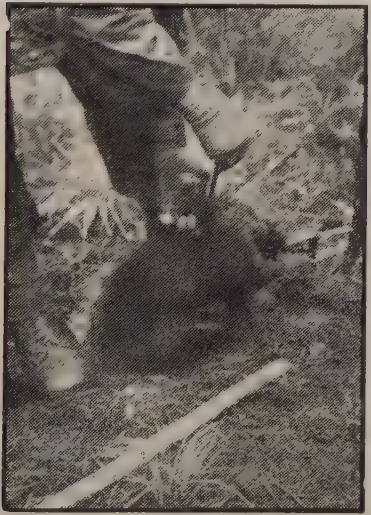
Care should be taken when setting traps. The practice of using the foot for compressing the spring is not advisable, as it tends to throw the spring out of alignment—the wire-spring trap is particularly susceptible to damage in this way. The correct procedure is as follows:—

1. Kneel on right knee.
2. Grip the trap-spring in the right hand.
3. Flip the tongue to the not-set position.
4. Rest the plate and the jaw frame on the left knee.
5. With the right hand, push down on the spring of the trap, at the same time opening the jaws with the left hand.
6. Grip the jaw on the tongue side of the trap, holding it open by gripping the jaw and the underside of the plate frame.
7. With the right hand flip over the tongue, press down with thumb of right hand, at the same time using the forefinger and middle finger on the underside of the plate to lift it into the set position with the tongue.
8. Remove the left hand, keeping the plate pushed up in the setting position, and remove the fingers from the underside of the plate.

METHOD OF KILLING

[*Ministry of Works photo.*

Stunning a trapped opossum with a heavy stick.



[*Ministry of Works photo.*

Killing the opossum after stunning it. The animal is grasped by the head while the tail is held under the foot.

Trap Lines

Traps should be inspected before setting up trap lines, and the hinges of tongues and plates oiled to ensure quick springing.

In ground setting, when staples are used for attaching traps to trees, the chains should be stapled as high as possible in positions where the staples can be drawn easily with a claw hammer.

Where traps are set on punga runs the chains must be attached low down so that the animals caught are not caused unnecessary suffering by hanging from the traps. This procedure is required by law.

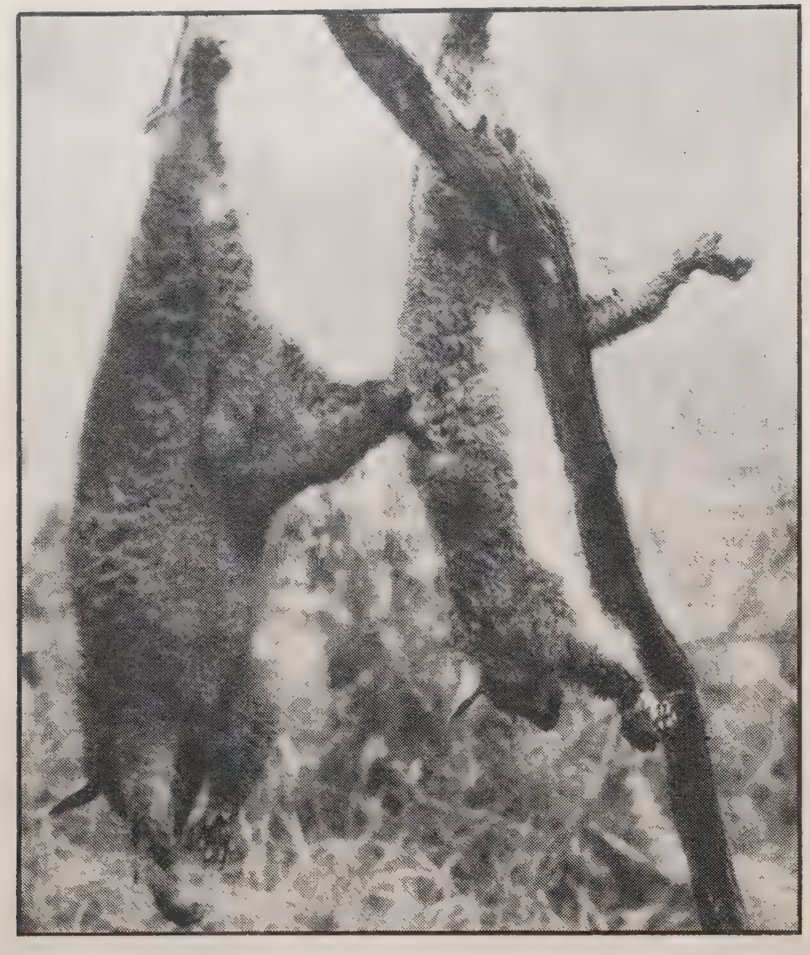
In any set the trap should be bedded down evenly so that it cannot rock and so cause faulty springing. Sharp obstructions, which may damage the opossum's fur when it is caught, should be removed from the vicinity of the trap set, together with debris such as dead branches, leaves, and sticks.

A heavy string noose from which to hang freshly-killed opossums for cooling should be secured to a tree in a position handy to each trap set. The bodies should swing clear of all obstructions and be above the reach of wild pigs or other animals. Free circulation of air saves unnecessary blowing by flies.

Heavy and indiscriminate blazing of trap lines and sets is not necessary and should be avoided, as blazing into the wood leaves a tree open to disease and insect damage. Sets can be marked and numbered effectively by writing with an indelible pencil upon light scarves cut into bark but not penetrating through to the wood. This numbering is essential to avoid missing traps. Special care is required in snow country where a heavy fall may bury both traps and animals caught. The blazing of trees to attract opossums to the sets in not necessary.

Killing Up

Trappers have many ways of killing opossums: It is frequently done by piercing the brain with a sharp instrument such as a bayonet or a hand slasher, or by shooting the animal while it is still in the trap. Probably the best results are obtained by using a heavy stick (manuka is suitable) 2½ft. to 3ft. long and of about 1in. diameter. The opossum should be grasped by the tail and, without releasing it from the trap, pulled out to the full length of the chain. The animal should be given a sharp blow between and forward of the ears to stun it. It should be picked up as shown in the lower illustration on this page and a knife run lengthwise about 1¼in. down the throat, making a deep slit. The knife should be inserted under one of the two jugular veins, turned outward, and a cut made to the surface. The animal should then be picked up by the tail, released from the trap, and hung to bleed and cool off in the noose which was placed conveniently when the trap was first set.



[*Ministry of Works photo.*

Freshly-killed opossums should be hung overnight before being skinned. The string-noose method (left) is preferable to the method shown at right where the animal is suspended by its pouch, because there is less chance of damaging the fur and there is a freer circulation of air.

The opossum should be held only by the tail or a hind foot as a precaution against damaging the fur. Freshly-killed animals should be hung overnight before skinning. An alternative but less efficient method of hanging is to suspend the animal from a short projecting branch which is passed into the pouch or through a hole cut in the base of the scrotum.

Traps when reset should be as free as possible from dirt, fur, and blood.

General Methods of Control

The control or elimination of opossums in districts where they are plentiful will most likely require full-time intensive operations, but they can do considerable damage even when occurring in numbers too small for the methods already considered to be applicable. Then there are other factors: The householder frequently has to avoid possible injury to children or domestic animals; the orchardist or suburban dweller may suffer considerable loss through occasional raids by opossums coming from considerable distances: the farmer may have to deal with opossums sheltering in scrub or flax and lawyer tangles, where effective trapping is impossible. No one system can be described to meet the requirements of all of these situations, but satisfactory results can be achieved by applying principles embodied in the following control methods.

Box Trap

The construction of a simple form of box trap which has been found satisfactory is shown in the diagrams on page 473. It should be placed in a situation frequented by the opossums. Carrot, apple, bread and jam, and flour and aniseed mixed with sugar are suitable baits. A trail of bait should be laid leading into the trap with further bait placed on the bait release bar. The opossum in reaching the bait pushes the release wire forward, thus allowing the door to fall.

Two stakes driven into the ground one on either side of the entrance make the trap more rigid. The doorway should be tied to each at both the top and the bottom to prevent distortion, which could allow the door to be forced open.

A box trap of wooden construction can be used fitted with the same type of release. The trap should be pegged to the ground when set.

When used near dwellings the box trap is perfectly safe, though the disposal of opossums can be a problem for the less lethally minded. It is best attended to in the following manner: Alarm the animal as little as possible and make all movements without haste. Urge the opossum toward the back of the trap, open the door cautiously, grasp the tail, and kill as detailed on page 471. (Place stick and knife in an accessible position before opening the door.) Alternately, the trap can be immersed in water or the animal can be killed by shooting or poisoning it.

Snares

Snares are efficient, but their use requires a higher degree of skill than does the spring trap. The main advantage is that snares can be made of easily-procured materials when steel traps are not available. Thin, inconspicuous, flexible wire is best; to avoid kinking it should be attached to a staple or other attachment by a short length of heavy cord. If the strength of the wire is considered to be insufficient, several strands may be twisted together. The eye of the snare should be tied so that it cannot tighten and the noose always runs freely.

The most common types of snares used are:—

1. **The fixed-run snare,** as shown in the illustration on page 468. The diameter of the noose should be about 4½in. and it should be set at right angles 1in. above the ground. For purposes of illustration the snare has been clearly shown. In practice this should be avoided. If camouflage is necessary, use the surrounding vegetation.

2. **The punga-run snare:** The same snare as in 1 is used, set on runs against selected trees in a similar position to the trap shown on page 468.

3. **The pole snare:** The snare is set on a long pole against a tree. Damage to the fur is minimised by using this type.

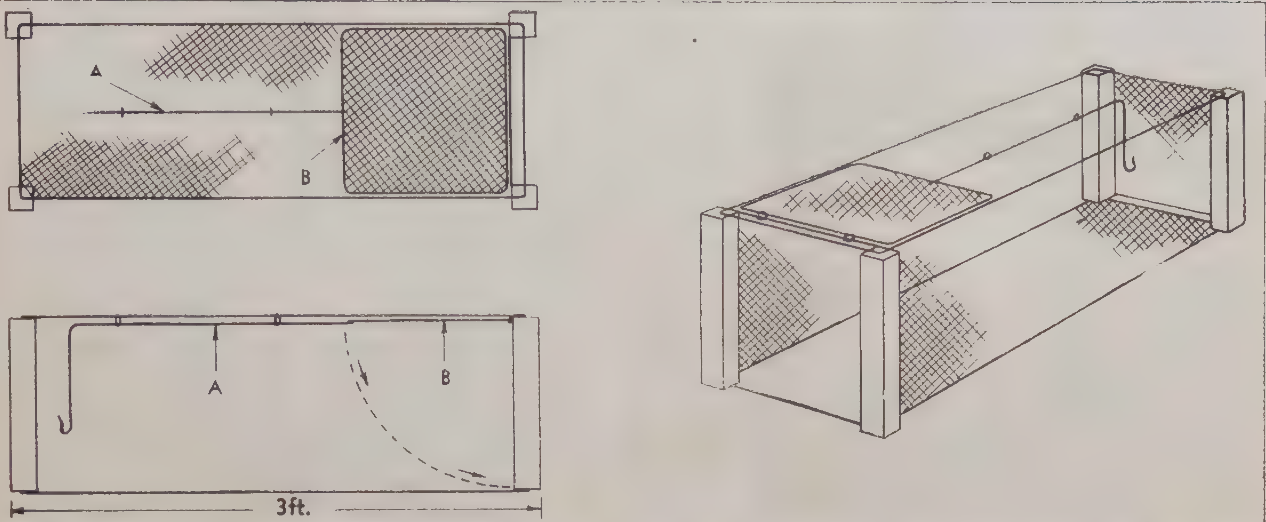
In general snares can be set either on pad runs, on the ground, on logs, or on trees.

Protective Devices

Any method of controlling opossums other than by killing is likely to prove unsatisfactory ultimately, but protective devices or repellants are of definite value because valuable trees or other property can be safeguarded while active control measures are taken. Similarly, they can be used for protection against sporadic raids by animals coming from a distance.

An 18in. band of vertical or overhanging sheet metal with its lower edge at least 3ft. from the ground will prevent opossums from climbing a tree trunk or building. A guard made from spiny shrubs such as gorse or boxthorn will serve the same purpose, though it is essential to have the branches base uppermost. They should be tied in closely, so that the tips fan out from the tree trunks. This type of guard is not suitable for protecting flowers, vegetables, bushes,

BOX TRAP AND PROTECTION DEVICES



Box trap (wire-mesh-covered frame or wooden box with hinged door and stops). A—Baited release bar. B—Door in set position.

or low-branching trees, for which chemical repellants (costing approximately 3s. per pint) can be used. They are economical and can give protection against a wide variety of animals and birds.

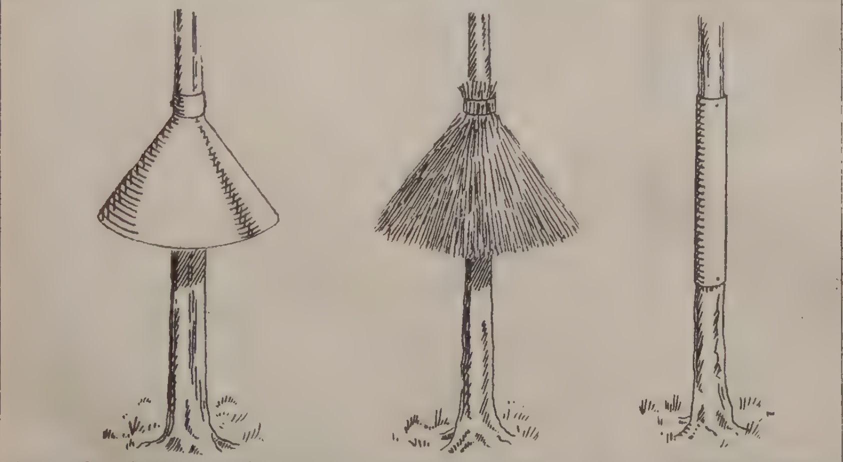
Repellants are not known to be manufactured in New Zealand, but there are English preparations which can be applied to cloth or rope tied around tree trunks; or gardens can be protected by surrounding them with twine soaked in repellant and held some 6in. from the ground.

Hunting

Hunting is not satisfactory in heavy bush, where the animals can rest in the tops of trees. It is effective during the day in scrub country, in gullies carrying secondary growth, in flax, or in isolated bush areas, etc., using dogs and a .22 calibre rifle or a shotgun.

Night work, with or without dogs, especially in moonlight, produces good results in thickly-infested areas, plantations, willow belts, or orchards. A light is required and the shotgun is preferable to the rifle. A torch can be fastened or held along the barrel of the rifle, but it is an advantage to have an assistant to work the light.

Though different methods of control have been described separately, the subject cannot be divided into so many watertight compartments. Before any system is decided upon, all the possible methods—spring traps, box traps, snares, repellants, etc.—should be considered and a selection made of those best suited for the particular problem. For example, a bait, a lure, or a lead-in bait trail might be used to advantage in conjunction with a snare. Similarly, brushwood, sheet-metal guards, or repellants may be used to divert animals from places where no traps are set and so concentrate them at a chosen point. Pine plantations may be trapped heavily during the pollen season when opossums are attracted there to feed on the pollen.



Protective devices. Left—Inverted metal cone tacked on tree. Centre—Brush, gorse, or boxthorn tied to tree. Right—Length of metal tacked on trunk.

Probably the farmer and the orchardist will, from the data given, each find sufficient to meet his requirements, but greater difficulty is likely to be experienced by the householder who suffers sporadic raids from opossums which are the outflow from a sparse to moderate population found in neighbouring large areas of broken country or reserve. If such a district is closely settled, some form of a local committee could be set up to organise concerted action. With encouragement and instruction in method, much can be done by boys, who find the opossum a source of interest and profit. More direct action could be taken by a committee in obtaining bulk supplies of traps, oil of aniseed, and repellants, and in encouraging their use.

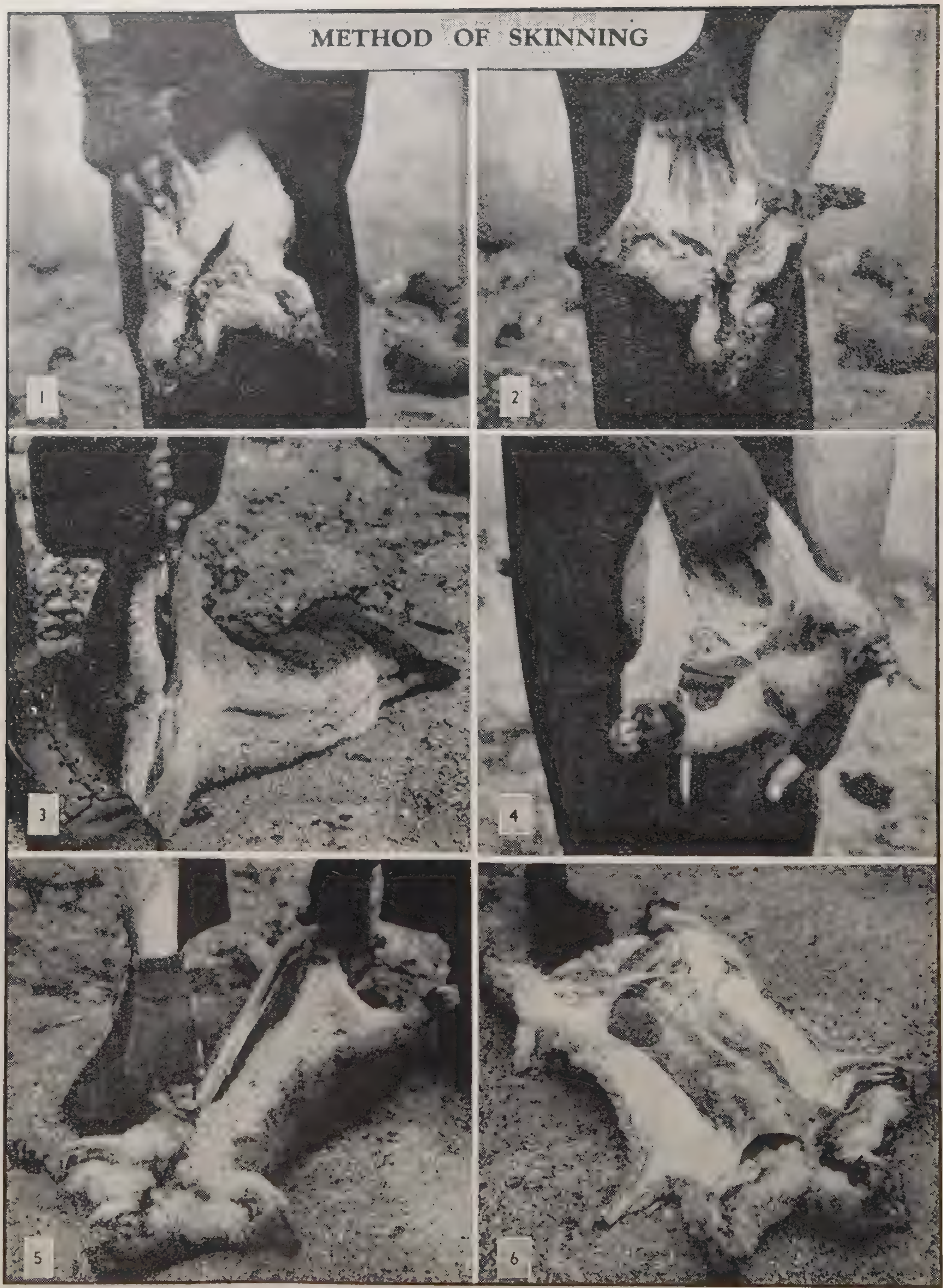
In the case of an isolated farm dwelling where community effort is impracticable, it may be possible to arrange farm management to give relief. It would be desirable for the homestead area to be separated by a wide belt of pasture or cultivated land which offered no daytime shelter to opossums.

Finally, opossum-proof fences could be provided. These must be of wire mesh up to 2ft. 6in. and topped by 18in. of sheet metal continuous over the outer face of both posts and battens.

Skinning

The method of skinning used depends upon the way in which the skins are to be dried, but much of the general detail in the system described is applicable to all methods of skinning.

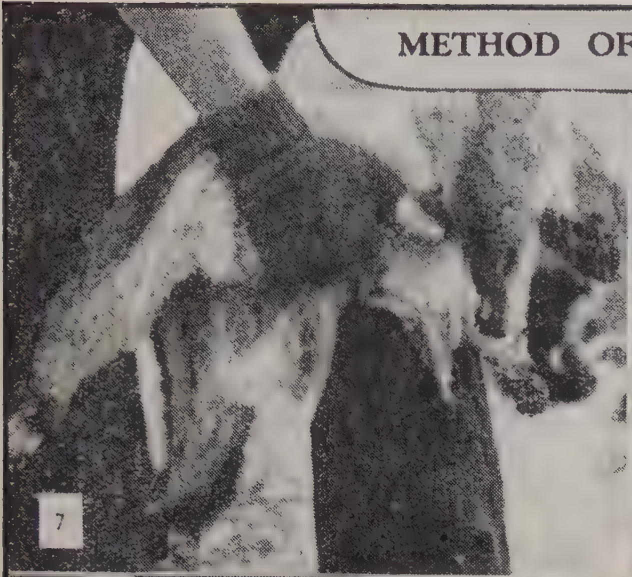
The animal should be cold to reduce the chance of windowing or furring the skin. Woollen mittens (or old sock tops) with the fingers free are essential for this method when rolling skins off very fatty opossums. The woollen mitten enables the palm of the hand to grip the flesh of the animal. It must be understood that the body is pulled and rolled from the skin—not the skin from the body. Details of skinning procedure are given on the three following pages.

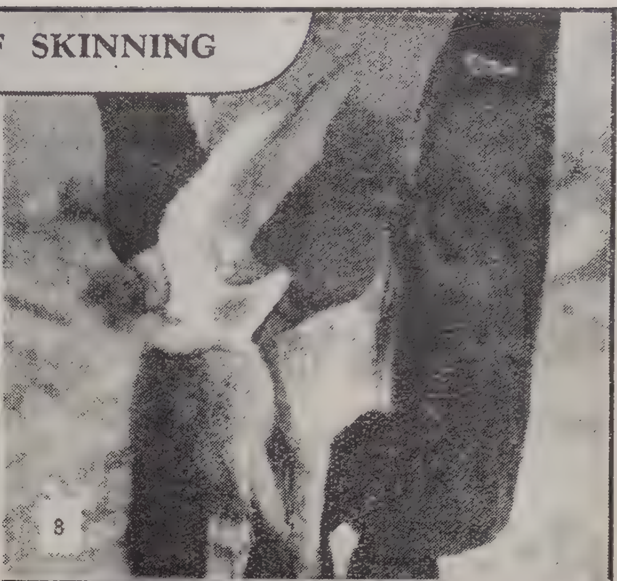


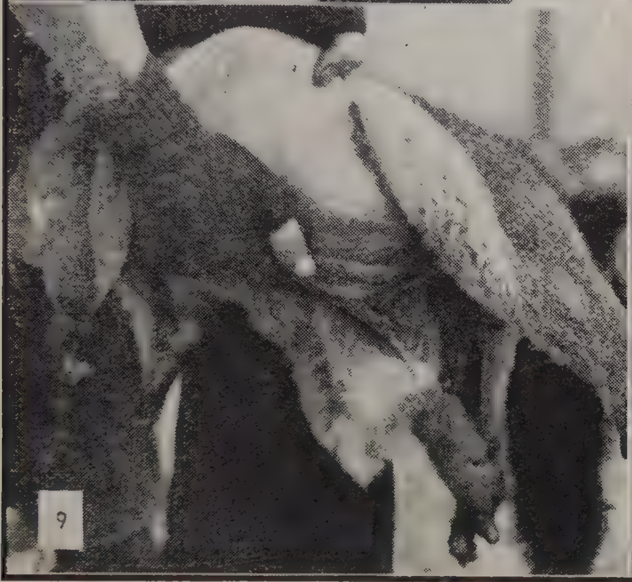
METHOD OF SKINNING

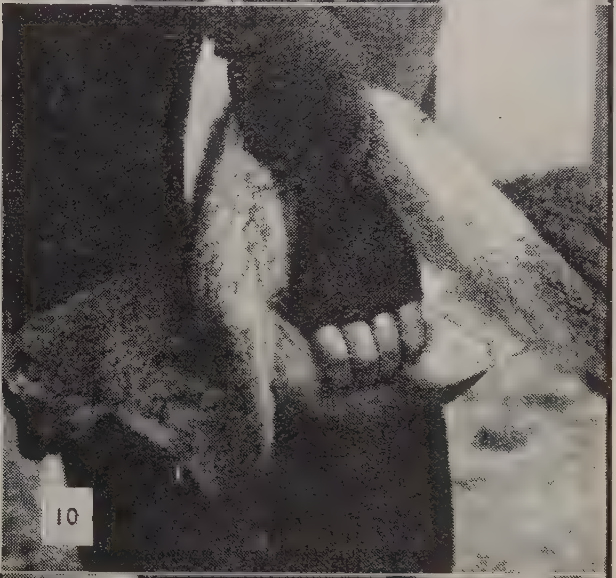
[Ministry of Works photos.

METHOD OF SKINNING

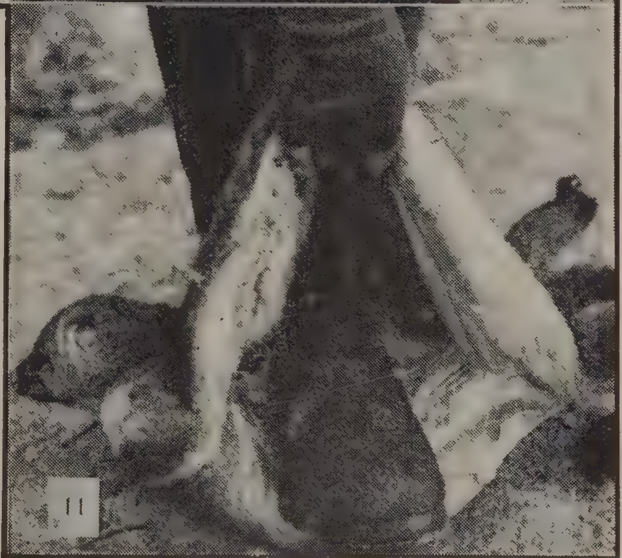

7


8


9

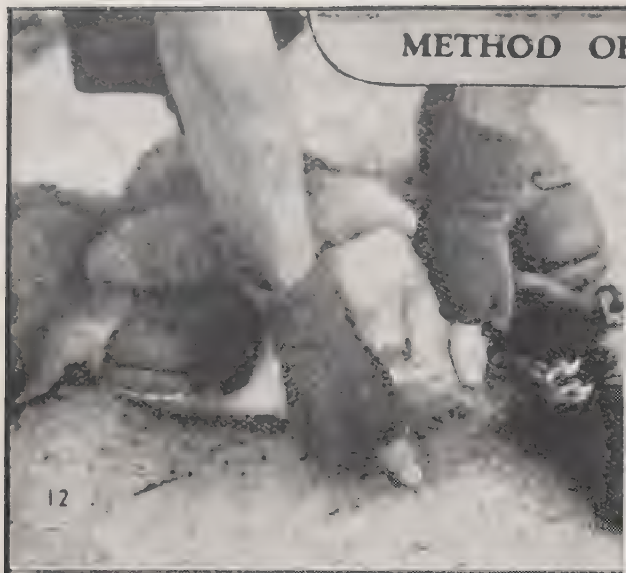

10

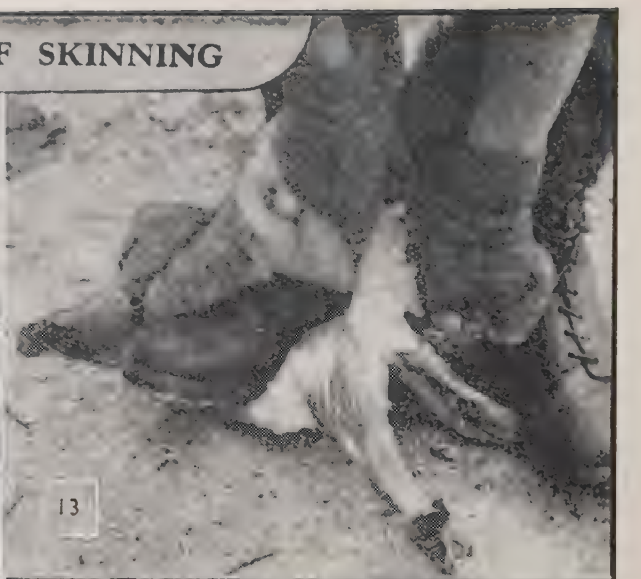
1. Place the animal between the knees, cut off the ears at their base, cut across just below the foot of each foreleg in turn, then run the knife from the cut in the foreleg toward the lower part of the neck (not to the brisket), and continue up the neck. After the forelegs have been opened up, the cut in the neck is V shaped. 2. Holding the head with the left hand, grasp the V piece of skin and pull (start with a knife) until it is fairly free of flesh. Punch down over the brisket as far as possible. 3. Remove the animal from between the knees, place it on the ground, and open up the hind legs. If a foot is placed on the opossum's hind foot and its legs are stretched apart, there is a straight run across from left to right. 4. Place the opossum between the knees, free the skin, and punch down until the skin is freed from the flesh along the whole length of the abdomen through to the anterior opening. 5 and 6. Place the animal on the ground for opening up. If it is a male, insert the knife above the testes and cut forward to the throat; then cut out the testes. If it is a female, cut out the pouch. Make the final cut at the back where the left hand holds the skin. 7. Roll the skin part of the way round to the back. 8. Clear down the flanks to the hind legs. 9. Roll the skin until it is free from brisket to backbone, enabling the hand to go right through. 10. Grasp the rolled back skin with one hand, place the other hand on the body, and pull to free the middle part of the back. 11. Place the opossum on the ground with its head to the right, put the right foot through the opening that has just been made, and free the skin to the hind legs.

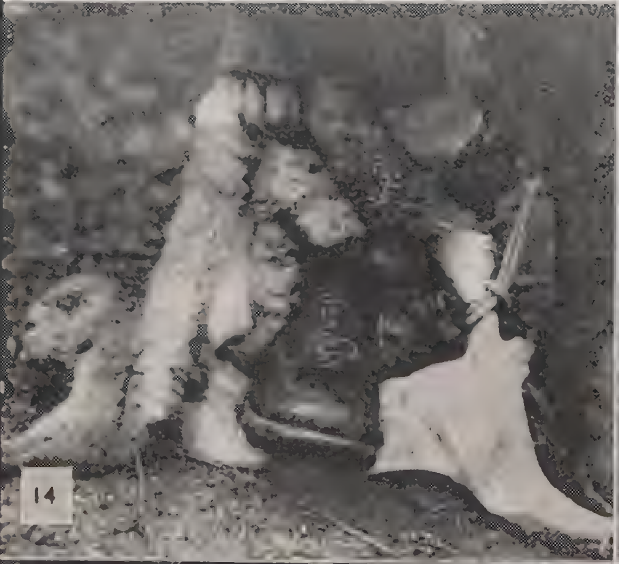

11

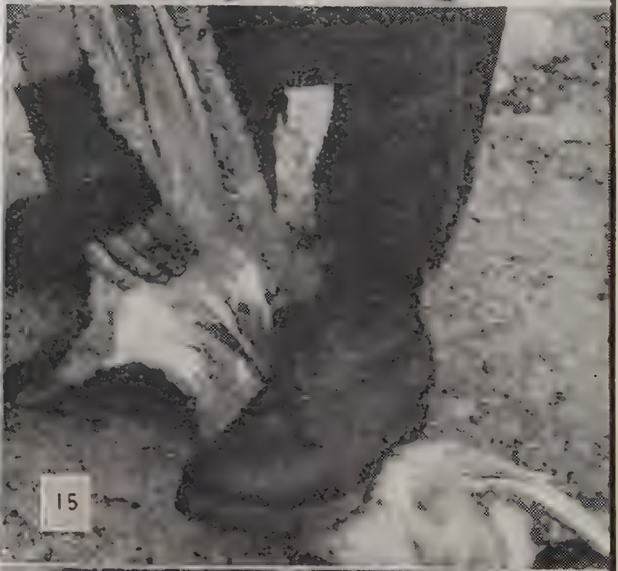
[Ministry of Works photos.

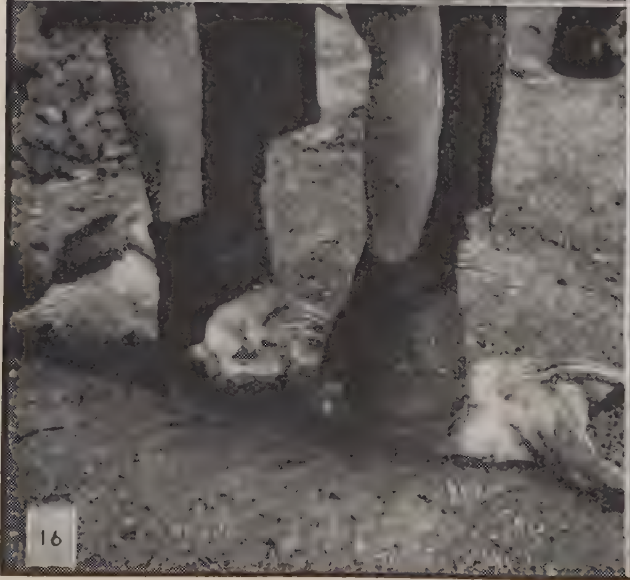
METHOD OF SKINNING

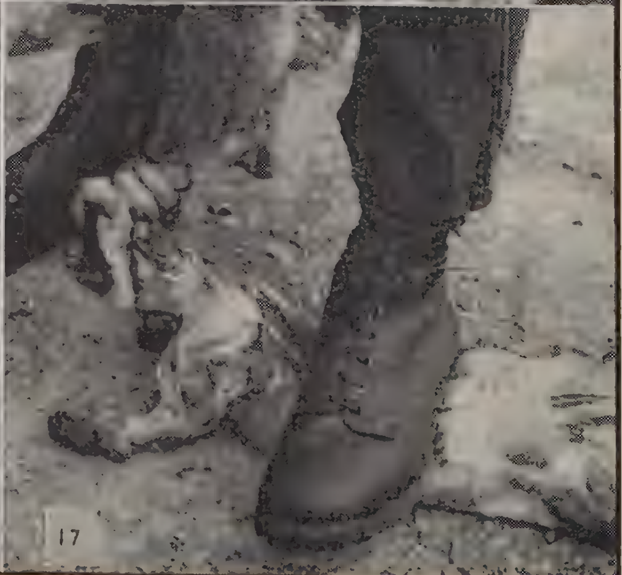

12


13


14

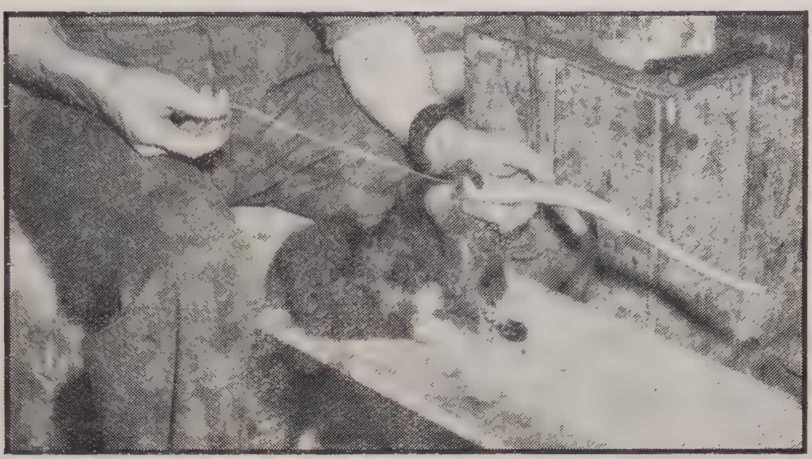

15


16


17

[*Ministry of Works photos.*

TREATMENT OF SKINS



[*Ministry of Works photo.*

Tailing. The tip of the tail has been cut off and the fur is being turned inward with a bicycle spoke.

Tailing

The tail skin when freed remains with the fur side facing outward. To ensure drying, the flesh side must be exposed. This reversing operation, termed tailing, is usually left until return to camp. A short length of stiff wire about 12 gauge is required (a bicycle spoke is excellent). Normal 6-gauge fencing wire can be used, but it is a little heavy. Cut off the tip of the tail, the exact length removed depending upon the thickness of the wire. Tuck in the end with the wire, then turn the tail inside out (see illustration on this page). Cut from the general skin opening back through the anus, continuing about ¾in. up the tail. Leave the skin in a cool place away from the fire until pegging can be done.

Stripping Skins off Boards

As routine procedure requires the removal of earlier skins from the drying boards before the current day's catch is pegged, directions are given here for stripping the boards before the pegging of skins is described. As skins remain on the drying boards for some 24 hours only, firing and hut temperature must be regulated to accomplish sufficient drying in this time.

On arrival back in camp, first take the skin boards down from the skin-board frame and stack them away from the fireplace. If the camp floor is earth or gravel, open out a chaff sack or some similar sacking and stack the boards on it with tail ends up. At this stage the fire can be lit without the dried skins becoming heated and so curling when removed from the boards.

Take a claw hammer, and starting at the top (tail end), run the claw down the line of nails from the second nail to the bottom. In this way the pegging nails of each side can be removed with one or two runs of the hammer. Pull out the remainder of the nails; stack the skins in a convenient place ready for splitting the tails, with the boards in easy reach of the pegging boxes.

The pegging nails (where there is not a wooden floor) will be found collected on the sacking put down before starting work. They should be collected and returned to their box for further use.

Pegging Skins

If the highest grading is to be achieved, skins should conform to a fairly-uniform width (standard length is not so important), which is secured best by pegging skins on boards 36in. x 10in. x ¾in. Both sides are used so that each board takes two skins. A large skin is taken to the edge of the board and any slight amount of slackness is taken up by allowing extra width. Discretion is needed in pegging medium and small skins, which should not be over-stretched in width, and the edge of the board should be used as a guide to ensure regularity of shape. Tails are pegged last.

A cobbler's hammer with the handle shortened and the face ground flat is the most suitable type for pegging. Nails should merely be lightly tapped into place to ease withdrawal during stripping. When the skin has been pegged the pointed pieces and flanks should be trimmed, but a minimum of trimming should be done. The finished skin boards are suspended by two bent nails from the rope loops and staples of the skin board frames.

[*Ministry of Works photo.*

Removing end pegging nails. The side nails have already been swept out.

Tail Splitting

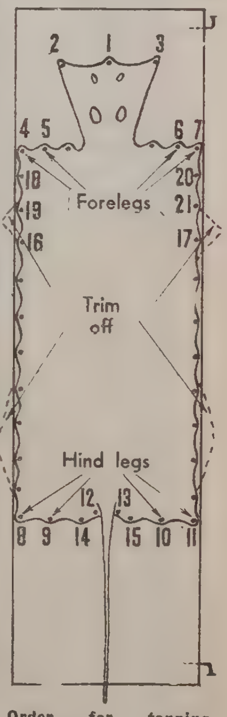
Lay the skin on a pegging board, insert the knife about 1in. from the base of the tail, and cut toward the head. Reverse the knife and cut back for the full length of the tail toward the tip. Open the tail out.

Airing Skins.

After the tails have been split hang the skins on the airing lines for at least 24 hours. Air them for a further 3 days or longer on short sticks or saplings each holding 25 to 30 skins. Thread the skins through ear holes, facing skin to skin in pairs, and hang the bundles at the back of the camp before stacking them.

Stacking Skins

Stack the skins in pairs, facing skin surface to skin surface, on an extra bunk or in any warm dry place where they can be reasonably flat.



Order for tapping pegging nails into skin boards. Where numbers are not given the order is optional.

SKINNING PROCEDURE

12. Without changing position, roll the skin down each hind leg and tear it off near the foot. 13. Rock the skin off to the base of the tail, working back up, by pulling alternately on the free ends of the leg skins. 14. Keeping the right foot on the body, place the left foot on one hind leg. Now remove the tail skin with a sharp pull on a heavy cord, which is fastened round the base of the tail by a noose formed in the bight of the rope. 15. Place the left foot on the body and pull the skin up toward the head. 16. Free the forelegs and continue right up the neck. 17. Place both thumbs upon the nose and lever the skin free of the head with the fingers and pull it right off. Shake and flick the skin to remove dirt and surplus fur. (If the fur is muddy it can first be washed in a creek at the camp. It should be drained before pegging or framing.)

UNCLE FRED SAYS—

IT'S

FAULTY

SETTING

When the Plough Won't Go into the Ground!

The cause when the plough won't go into the ground is probably one of the following: (a) Not sufficient dip on shares; (b) Shares badly worn; (c) Plough being pulled up too much in front; (d) Skeiths too far forward, and low.

Experienced farmers know that when it comes to fine furrows, a correctly set R. & G. Plough has no equal.

REID & GRAY LTD.

Head Office and Works:
BURNSIDE, OTAGO.
Branches at INVERCARGILL, GORE
and BALCLUTHA.

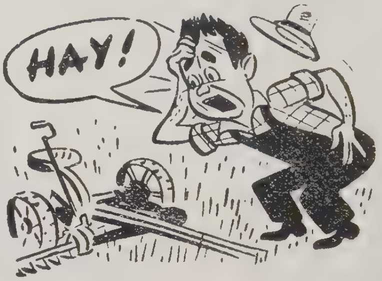
AGENTS—Auckland: Alfred Buckland & Sons Ltd. **Hamilton:** A. M. Bisley & Co. Ltd. **Gisborne:** Machinery Exchange Agency. **Hastings:** Bull & Hodgkins. **Palmerston North:** Reid & Gray Agency Co. Ltd. **New Plymouth:** J. B. MacEwan & Co. Ltd. **Masterton, Nelson and Wellington:** Levin & Co. Ltd. **Blenheim:** R. Cresswell & Sons Ltd. **Christchurch, Ashburton, Timaru, Waimate, and Oamaru:** National Mortgage & Agency Co. of N.Z. Ltd.

Mr. FARMER

You'll not cut your Hay unless your Cutter Bar is in good order.

★

WE NOW OFFER YOU OUR FACTORY BACKED



CUTTER BAR REPAIR SERVICE

FOR ALL McCORMICK-DEERING TRACTOR AND HORSE MOWERS

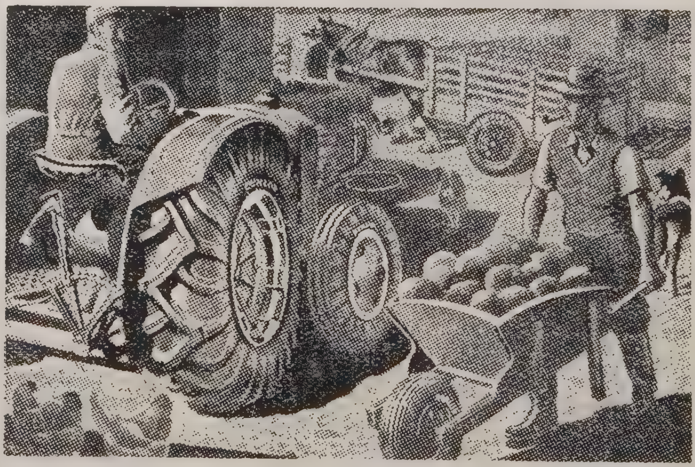
We've got the GENUINE IN PARTS and the trained men to see that your Mower is ready to cut Hay when YOU are ready.

RAIL YOUR BAR *NOW* TO YOUR NEAREST BRANCH

INTERNATIONAL HARVESTER CO. OF N.Z. LIMITED

Auckland · Palmerston North · Wellington
Christchurch (Head Office) and Dunedin

Tyres revolutionise Farming



To grow more food on your farm and to get more work done with less labour, fit all forms of transport with DUNLOP tyres and wheel equipment—your tractors, barrows and all your animal-drawn vehicles. DUNLOP rubber boots are a further valuable aid to farming efficiency and increased productivity. Be wise—modernise!

DUNLOP

serves Agriculture

DUNLOP NEW ZEALAND LIMITED

Bundling and Pressing

Skins should be brushed with a stiff brush to remove all foreign matter and loose fur before being pressed before dispatch, as this improves the appearance of the fur. Skins should be pressed as indicated in the illustration on page 480, which also shows details of the press construction. Eighty skins make a convenient-sized bundle, but irrespective of size a standard number of skins should be bundled to facilitate counting later. When pressing lay the first skin with the flesh side down and the fur up; then lay skins in pairs with the fur sides facing outward and with the tails of alternate pairs placed at apposite ends. Place the last skin with the flesh side up; after arranging the ropes in position put the board in the press frame. Press with a long pole or sapling and tie the bundle securely. To guard against mildew defer the bundling of skins until trapping operations are completed or until just before dispatch.

Dispatch of Skins

If deterioration during transport is to be avoided, first see that the skins are given sufficient airing before dispatch. They must be **thoroughly dry.** Use a quick means of transport because skins deteriorate if held for any length of time, and damp or mildewed skins arriving in store are graded down. On arrival bundles are opened and skins are loosely stacked in piles of 15 to 20 in a dry, well-lit building.

Framing of Cased Skins

The method of sleeve skinning is required when skin frames are used on areas where access is difficult and skin boards cannot be taken because of transport difficulties. There is no uniformity in the design of skin frames and many trappers make their own. The construction of a very efficient type of frame is shown in the diagram on this page. Other types of frame are made from a piece of 4in. x 1in. timber, or from plywood shaped similarly to the wire one shown.

Woollen mittens are not needed, but the list of equipment given on page 469 will have to be modified as follows:—

Delete: 1 claw hammer, 2 pegging hammers, 4 kerosene boxes, ¾in. staples, 2 (of 6) chaff sacks; but add: 80-90 frames, 800 wood-spring clothes pegs.

In sleeve skinning proceed as follows (the references in parentheses are to the illustrations at right):—

Cut off the ears.

Cut round each foreleg near the foot and then cut straight across to the brisket.

Clear round the forelegs and shoulders until the hand can be passed right through (upper).

With the hand through, place one foot on each foreleg and pull off the head skin (middle).

Open up the hind legs and cut out the pouch or testes.

With the feet again holding the forelegs, pull the skin up the body as though pulling off a sock (lower). Clear the hind legs.

Remove the tail skin.

Turn the skin fur side out, shake, and roll it up for carrying in a pack.

The head skin should be complete to take the point of the frame. When this method of skinning is used the cut made in the throat when killing should be as small as possible.

Irrespective of the method used, care in skinning is necessary to avoid damage to the fur.

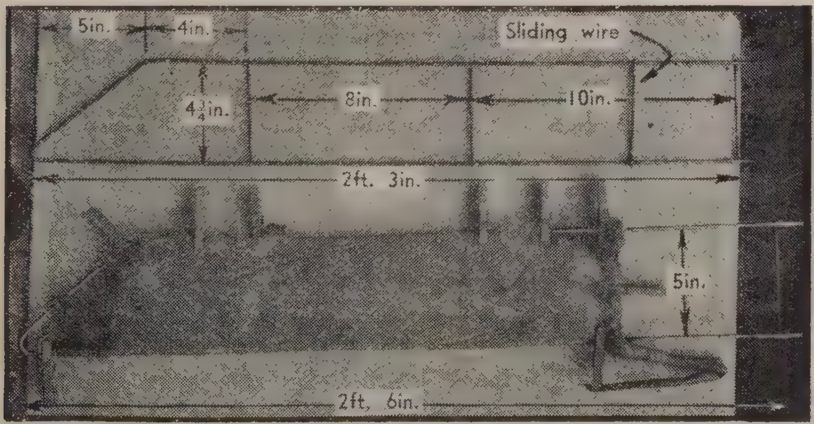
The following method of drying is used after sleeve skinning: Remove all the surplus fat and flesh before framing each skin. Pull the skin over the frame with the head skin to the point, fold over the flaps, clip on the spring pegs, and stretch the skin down the frame. Fold over the flaps on the tail end of the skin and clip on the pegs. The sliding wire at the tail end can be adjusted to suit any length of skin. To remove the skin from the frame remove the pegs and cut down the belly of the skin, following the edge of the frame. Trim lightly.

Frames can be hung up for drying on bent nails driven in to a framework as used for holding boards.

Pole Pegging of Cased Skins

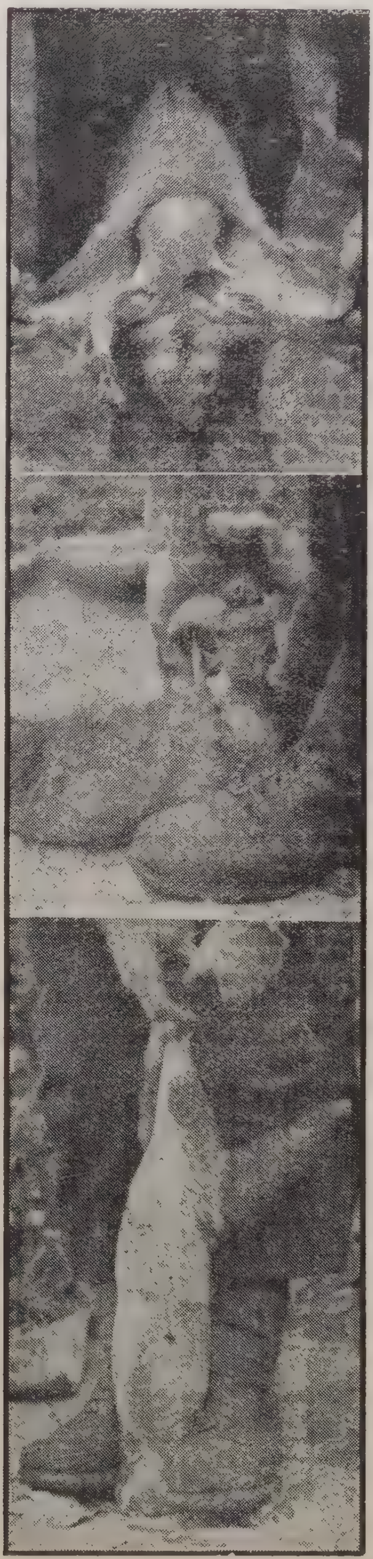
Where pole pegging is done animals should be skinned in the same manner as for framing.

Pole pegging as a means of stretching the drying skins is not very



[*Ministry of Works photo.*

Skin frames made from No. 7 gauge wire. The sliding wire is of lighter gauge.



[*Ministry of Works photos.*

satisfactory because owing to their size and bulkiness, poles take up space in a camp where large numbers of skins are handled, but poles can be used where skin boards or frames are not available. Poles should be trimmed and smoothed off to lessen damage to fur when skins are pulled on. A slight taper on the poles is an advantage. Skins are pegged in position with 1¼in. box nails. To remove the skins from the poles first take out the nails and then, using a sharp knife, cut down the centre of the belly through to the neck.

Skin Quality

Grading: In general, skins are sorted according to fur colour into some nine or more classes as shown in the table on this page. In each class they are graded according to quality—super, first, second, or third.

> **It is inevitable that some of a trapper's skins will be graded low because of the presence of inkspots (dark patches) or windows (patches from which fur has been lost by accident during life), but buyers complain that a large proportion of skins are graded down on account of trappers' negligence. Rough, damaged, badly-stretched, stale, or weevil-infested skins have very little value.**

Even between two successive grades difference in value varies between 50 and 100 per cent., so that extra time spent in attending to skins is likely to bring in a greater financial return than the same time spent in trapping; it may mean the difference between good returns and failure.

Clear, densely-furred skins with few inkspots are graded as supers or firsts. Inkspots or windows, irrespective of other conditions, grade skins down in proportion to their numbers or area, though their effects are less if they occur near edges.

> **Skins for sale should not be tanned, cured, or salted, as any of these treatments makes them very difficult to sell.**

Seasonal condition of fur: The most suitable period for commercial opossum trapping is from the beginning of July until the end of September, because the fur condition is then at its best. At the end of September skins begin to deteriorate. This change occurs suddenly—in a matter of weeks. The tips of the fur become brittle and break off while the animal begins to shed the winter coat. Stomach contents examined at this period contain fur balls. If examined on the flesh side, these unprime skins are seen to have changed to an inky-blue colour. The summer skin is lighter furred, but is not necessarily of poorer quality.

As the legal prohibition of summer trapping has now been lifted, profitable work can be done during this period.

The results of trapping throughout a year (1946-47) by the Department of Internal Affairs are shown in the graph and table on this page. Because trapping was only incidental to other work, the number of opossums taken each month bears no relation to relative difficulty of capture. As far as can be judged there is no significant difference in the number of opossums that can be trapped at any time of the year. Profitable trapping can be undertaken in both summer and winter seasons, but, as the graph shows, skins are least valuable from October to January, when the winter fur is being shed.

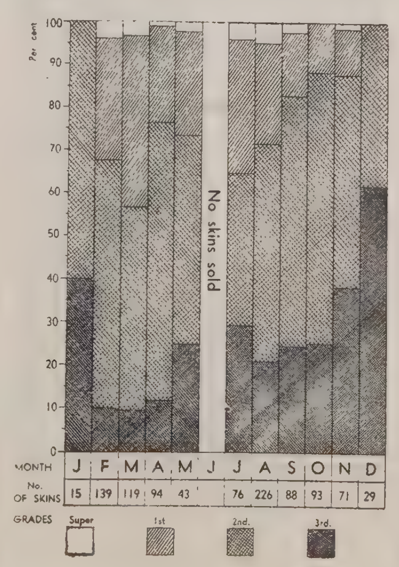
PRICES FOR OPOSSUM SKINS

Skin grade	July- October Average price s.	d.	November-May Average price s.	d.	Super value s.	d.
Red brown ..	3	8	3	4	6	4
Dark brown ..	3	9	3	9	6	10
Black	2	8	2	7	5	10
Red neck grey	3	9	4	0	8	6
Rusty	4	11	5	8	8	0
Pale	4	7½	4	3	8	2
Grey	4	10	4	11	9	4
Blue	12	0	6	2	17	11

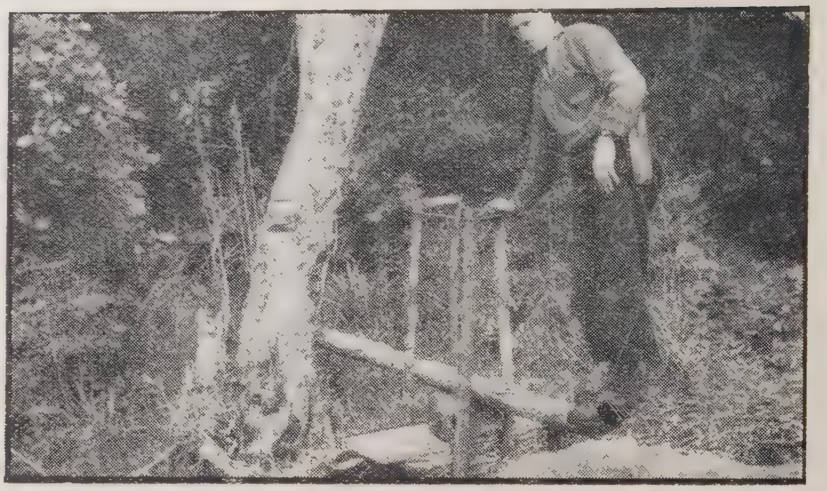
Acknowledgments

The authors wish to acknowledge the valuable assistance given by Dalgety and Company, Ltd., the Wellington City and Suburban Water Supply Board, the Meteorological Office, the Botany Division of the Department of Scientific and Industrial Research, the Aerodromes Branch of the Ministry of Works, and the Army Department.

MONTHLY GRADING OF SKINS



RETURNS FROM SKINS



[*Ministry of Works photo.*

Method of pressing skins. The photograph shows the operation of the press, though in practice the pole would be longer.

HOME CURING OF OPOSSUM SKINS

HOME curing of opossum skins (not for sale) should be done as soon as the animal is skinned. If dried skins have to be used, bring them to the same degree of softness as "green" skins by putting them in a very weak solution of salt and water. A simple method of curing is as follows:—

Wash the skins thoroughly in warm soapy water. Mix 2 parts of alum to 1 part of salt thoroughly in hot water to form a thin paste or better still add more water to make a weaker solution. Place the skin on a board, fur side down, and apply the solution to the skin.

Fold the skin in two, fur outward, ensuring that no fur is in contact with the treated surface. Leave it for 12 hours and repeat the whole process three or four times according to the strength of the solution. Twelve hours after the last application tack the skin out flat on a smooth surface and leave it in a warm, dry atmosphere, but not in direct sunlight.

To make the skin supple drag the skin surface backward and forward over a bar or board before the skin is completely dry. When it is quite dry finish it off by rubbing the surface with a piece of pumice, taking care not to rub right through the skin.

If the curing solution is made to the consistency of fairly-thick porridge, one application of it will do. In that case the skin should be left for 24 hours and will require more working to make it supple.

The Principles of Poultry Breeding

THE basic laws of inheritance were described in last month's "Journal" in the first of a series of articles by F. C. Bobby, Superintendent of the Poultry Industry, Wellington, on the principles of poultry breeding. This article continues that description and should be read only with an understanding of the principles enunciated in the previous one.

AN understanding of the law of inheritance assists the breeder to comprehend some of the practical difficulties of poultry breeding. It shows that, though two birds may be apparently similar in external characteristics, when they are used for breeding some of their progeny differ markedly, one breeding pure to type while the other throws varying progeny. When this principle is applied not only to the plumage colour but to many other inherited characters of a bird, it should be appreciated how any mating may throw progeny differing from what is expected and varying from the parent stock. When this idea is carried a stage further and the inherited characters which cannot be assessed visually are considered—such as egg production, hatchability, and egg size—there is little wonder that many matings fail to produce the results hoped for by the breeder.

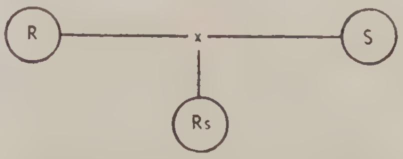
It becomes equally clear that the breeder must acquire a practical knowledge of the characteristics for which he is breeding in his stock. For instance, in the example so far quoted the black plumage of the Black Rose-comb Bantam was dominant to the white of the White Rose-comb Bantam. However, if a White Leghorn is mated to a Black Orpington, the progeny have a plumage which is predominantly white, the black usually appearing only in flecks or splashes. From this the breeder learns that the white of White Leghorns behaves in a different manner genetically from the white of White Rose-comb Bantams.

Single and Rose Combs

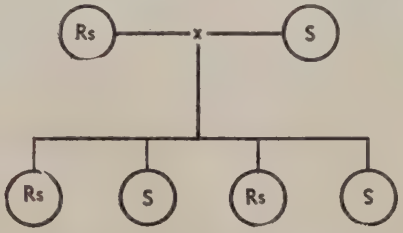
Another example of dominant and recessive characters and the law of their inheritance may be quoted:—

Wyandottes should have rose combs, but from time to time White Wyandottes with single combs appear in a commercial flock. It is known that a rose comb is dominant to a single comb, so the question arises: How do the single combs appear and how is the breeder to guard against their appearance?

The vast majority of White Wyandottes with rose combs are homozygous, or pure, for this character and, if mated together, they will always throw progeny with rose combs. However, among the male or female breeding stock there may be one or two birds which are heterozygous, or impure, for the rose-comb factor, though outwardly they cannot be distinguished from the pure rose-comb birds. To discover these unwanted impure breeding birds the poultry breeder mates his Wyandottes—males or females—with a single-comb bird such as a White Leghorn. (This can be done before the normal breeding season.) If the Wyandottes are all homozygous for a rose comb, the progeny will all be rose-comb birds. Rose-comb (R) is dominant to single comb (S), and diagrammatically this is what happens:—



On the other hand, if any one of these Wyandottes is heterozygous for the rose-comb factor, the progeny of this bird when it is mated to a single-comb Leghorn will include rose-comb and single-comb birds in approximately equal numbers:—



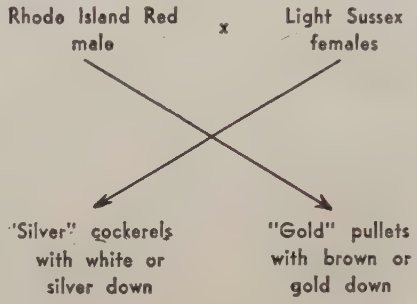
Testing a Wyandotte cockerel mated to Leghorn hens is simple, but a mating between Wyandotte hens and a Leghorn cockerel requires that each hen's eggs be kept separate at hatching time. The combs can be distinguished when the chicks are only a day old.

Inheritable Characters Vary

To make a complete study of the behaviour of inherited characters in poultry it is necessary to consult a text-book devoted to this subject, such as "Poultry Breeding" by Morley A. Jull (Chapman and Hall Ltd., London). This book contains a full scientific description of breeding for inherited characters, including all the latest information and research work in poultry breeding. What has been included in these first two articles is sufficient only to illustrate that there are laws of inheritance, but that many inheritable characters in a bird do not behave simply in breeding. Thus, when breeding is carried out for egg production, which in itself is not just one simple inheritable character, many and varied results are obtained. Like does not necessarily beget like. The high-producing hen may produce progeny which do not give high production in their pullet year. Breeding for egg production will be referred to later when progeny testing is discussed.

Sex Linkage

Poultry producers are now hearing of auto-sexing breeds. There is in breeding a phenomenon referred to as sex-linked inheritance or sex-linked characters. Expressed simply, these are characters in poultry, such as the down colour or the rate of feathering in chicks, which are linked with sex. In down colours there is the "silver" class, as in the Light Sussex or the Silver-laced Wyandotte, and a "gold" class, as in the Rhode Island Red, Brown Leghorn, Buff Orpington, and Red Sussex. It has been found that when a "gold" male such as a Rhode Island Red is mated to "silver" females such as Light Sussex the sex of the day-old chicks can be distinguished by their down colour. There is, in fact, a definite linkage between colour and sex:—

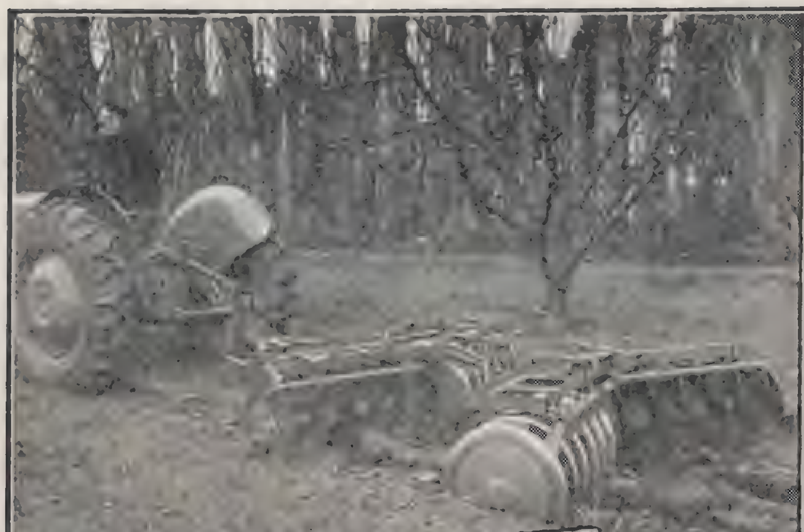


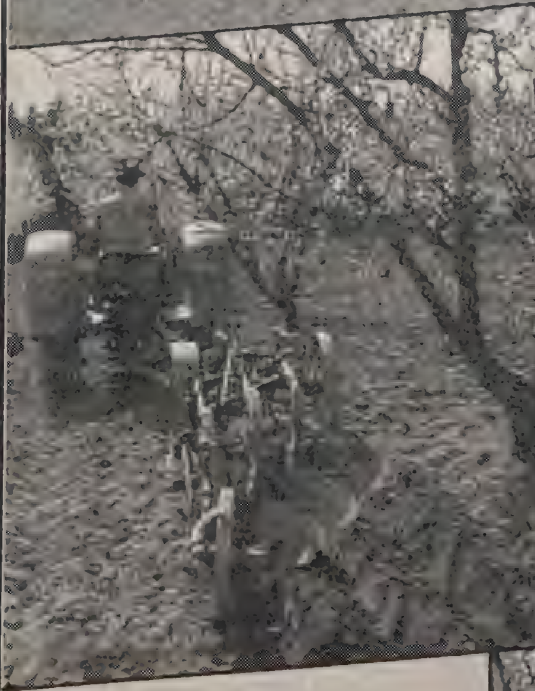
A criss-cross inheritance of sex and colour occurs, making it easy to distinguish between the sexes at a day old. However, if the cross is made the other way—Light Sussex x Rhode Island Red—all the progeny are white and consequently the sexes cannot be distinguished. To obtain sex linkage in a first cross of this kind the "gold" male must be mated to "silver" females.

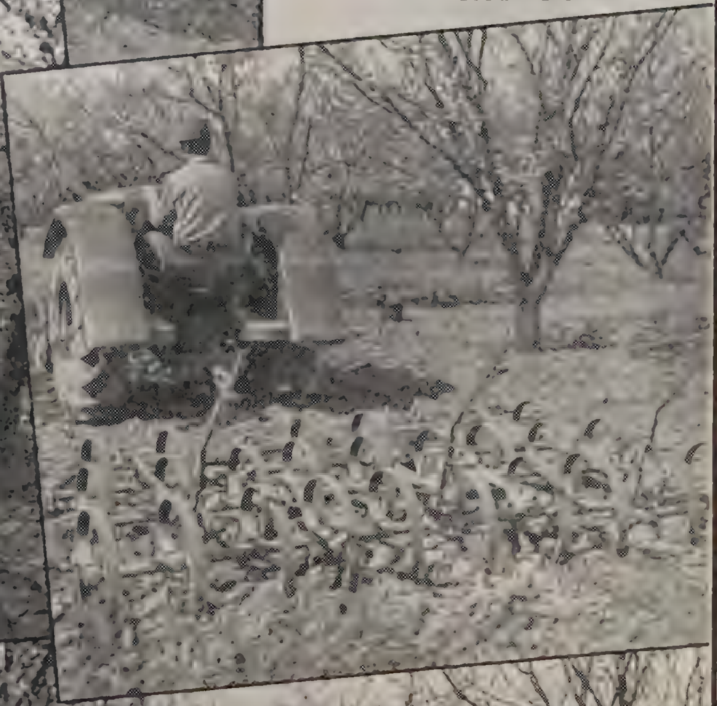
Sex-linked crosses are used extensively in England, more particularly the one referred to and the Brown Leghorn x Light Sussex. Both are good crosses for egg production, and the cockerels from the Rhode Island Red x Light Sussex cross make first-class table birds.

Sex linkage as a means of distinguishing the sex of day-old chicks has been carried a stage further than the cross-matings mentioned, which have limiting factors such as the necessity for using birds of two breeds and the fact that the progeny cannot ultimately be used for breeding purposes. A geneticist at Cambridge University, England, developed birds which breed true and yet have progeny which as day-old chicks carry markings on their down by which the sex can be distinguished. Thus sex linkage occurs within a breed, not a cross-breed, and the progeny ultimately can be used in a pure-bred mating. These are termed auto-sexing breeds, the best known of which in New Zealand are the Cambars and Legbars. The latter breed has been produced from the Brown Leghorn and the Barred Rock and is now being developed for commercial purposes. It has the advantage that the breeder can distinguish the sex of day-old chicks and does not need to employ a chick sexer or rear chicks "as hatched" unless he desires.

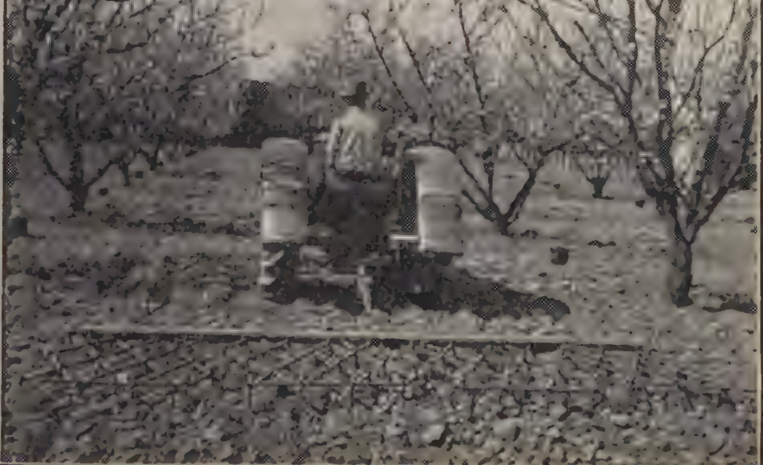
MODERN EQUIPMENT FOR CULTIVATION IN HAWKE'S BAY ORCHARDS







Upper—A modern type of tandem disc with two sets of divided gangs. Middle—Left: A low-set, 3-furrow orchard plough fitted with mechanical lift and medium-length mouldboards. Note how the offset drawbar makes it possible to plough close to the trees. Right: A set of spring-tined cultivators (three leaves), with floating action between the leaves, suitable for horse or tractor haulage. Lower—Set of diamond-pattern tine harrows attached to a wooden drawbar.



[*News-photo Service photos.*

Orchard Cultivation Methods in Hawke's Bay

IN recent years there has been evidence of a clearer concept of the principles and practices of orchard cultivation among fruit growers of Hawke's Bay. This has been paralleled by the development and availability of better types of tractors and implements, and growers are changing over to this improved equipment. As a result the modern type of orchard-cultivating equipment is at present well represented in the orchards of the district. The following article by T. Conway, Orchard Instructor, Department of Agriculture, Hastings, describes the present cultivation practices, with special reference to the kind of equipment in general use in Hawke's Bay.

IT is necessary first to outline the conditions under which cultivation work is carried out in Hawke's Bay. Briefly they are:—

1. Most orchards are planted on flat or almost flat land.
2. In the main the texture of the soil is very friable and it is not difficult to achieve a fine tilth.
3. With the exception of the hard-pan land of the Havelock North slopes the topsoil varies from reasonably deep to very deep silt loam, and the subsoil is generally of a silty to sandy nature.
4. Rainfall is well spread throughout the year except during midsummer, when hot and very dry conditions are likely to be experienced for fairly long periods.
5. Because of the conditions mentioned above, weed control is a reasonably-simple operation, but the maintenance of soil humus, texture, and tilth—in the interests of moisture conservation—is of prime importance.

As in recent years the majority of Hawke's Bay fruit growers have had very successful seasons, they have had the capital to outlay on modern equipment and today the poorly-equipped orchard is the exception rather than the rule.

Methods Used

It is obvious at present that many fruit growers are giving much thought to the principles of cultivation and to the practical application of these principles in the best possible way. Growers are beginning to realise that because they have had the advantage of high-quality land, they have in the past tended to abuse the land, and that if the productivity of their orchards is to be maintained, present cultural practices need revision. In fact it is obvious that if the fruit-growing industry in Hawke's Bay is to be continued on a permanent and profitable basis, improvements in cultural methods must be made, and it will therefore be necessary for all sections of the industry to examine critically present practices.

Though present methods of cultivation vary considerably, the main ones adopted are: (a) autumn ploughing and spring discing and cultivating; (b) spring ploughing followed by discing and cultivating; (c) spring discings only, followed by lighter cultivation with spring-tooth and tine harrows; or (d) spring discings only, followed by periodic discings only. The last three methods are used whether a green cover crop is turned in in the spring or not.

It has become apparent that considerable harm has been done to orchard trees by the careless use of offset tandem discs and by some orchard ploughs. To save hand work near the trees growers have been inclined to operate too close, with a deep cut on their implements, with the result

---

Heading photograph by News-photo Service.

FARM for PROFIT!

LEARN THE BUSINESS SIDE OF FARMING . . .

What to watch in buying a farm . . . how to finance and start on your own . . . how to keep simple books that give you a monthly record of your profit and loss . . . useful tips on the law that every farm manager should know . . . these are only some of the essential details taught by the Druleigh Book-keeping and Management Course. It teaches you to take out your own Balance Sheet and Income Tax Returns . . . to become an efficient farmer. Druleigh's special Diploma Course of Home Study training on Farm Management, Farming Law, and Farm Book-keeping is specially written by experts. A wonderful investment for any young man who wants to make farming pay.

BE A SUCCESSFUL FARMER

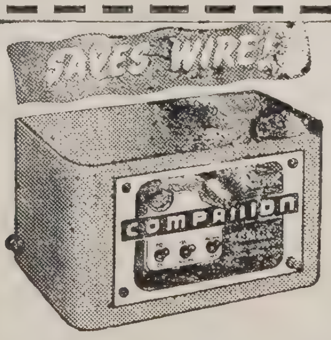
DRULEIGH College of

FARM BOOK-KEEPING
VULCAN LANE, AUCKLAND.

Dear Sirs,—Please send me, without obligation, full details of your simplified Farm Book-keeping and Management Course.

NAME ....

ADDRESS ............................J.A.



COMPANION

ELECTRIC FENCE

Quality Unit with a 1-YEAR GUARANTEE—use existing wire.
WRITE FOR DETAILS.

JOHNS LTD

JOHNS BLDG., [illegible] Box 471

SPEEDWAY STERILISER

BURNS OIL OR WOOD

Write for free illustrated catalogue to
SPEEDWAY PRODUCTS LTD.
26 Albert St., Auckland
South Island Distributor:
A. H. TURNBULL & CO. LTD.,
Christchurch

STEAM & BOILING WATER

SS-1-2

PEACE FROM PARASITES!

LICE ON LIVESTOCK

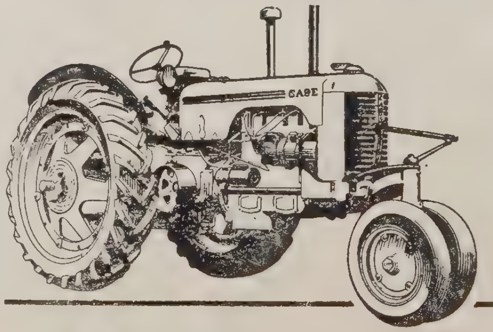
Users of COOPER'S LOUSE POWDER, which contains "Gammexane" gamma BHC, are really enthusiastic about results. It's not only the initial kill of parasites, but the remarkable degree of protection against reinfestation that makes the demand for this new product so great. COOPER'S LOUSE POWDER is suitable for all livestock and poultry, and can be used for treating valuable pedigree sheep out of the dipping season.

It is completely non-poisonous and available in handy 1 lb. and 2 lb. duster-top cartons, from Stock and Station Agents and Merchants or write to: Cooper McDougall & Robertson (N.Z.) Ltd. Box 599, Auckland.

NON POISONOUS
COOPER'S
LOUSE POWDER
CONTAINING
"GAMMEXANE"
IN ITS MOST EFFECTIVE FORM

COOPER'S

LOUSE POWDER
Containing "GAMMEXANE"
gamma BHC



MORE
Years of Use
LESS
Cost Per Year

● Case tractors are built to stay on the job. For years it has been a continuing Case policy to build extra service into every part, extra endurance into every tractor. The result is more performance from every pound you spend, no matter which Case model you select. These tractors are built to work and to keep on working . . . to give you more and ask for less. Ask your distributor for the size and type which fits your needs.

CASE

Distributors:

JOHN CHAMBERS & SON, LIMITED.
Sole N.Z. Agents.

Auckland, Wellington, Christchurch Dunedin, Invercargill, Timaru, Hamilton, Palmerston North, New Plymouth, Ashburton.

that extensive root damage has been done. As a result of this root damage many trees are today severely affected and apart from the loss of vitality from restricted root action, tree anchorage also becomes insecure.

Some growers have removed the lower branches of trees and have developed an upright type of tree with the object of assisting cultivation. The result has been cultivation too deep and too close to the trees, which may involve damage to the root system. Instead of making the tree the first consideration there has been a tendency to sacrifice the tree for ease of mechanical operation.

Trends in Cultivation

Though there is a considerable division of opinion among growers as to the merits of initial ploughing as against initial discing at the beginning of the season, it would appear that preference for discing is gaining ground. There are instances in Hawke's Bay where initial discing only has been the practice for 15 to 20 years or more, with no apparent detriment to the orchards. In fact, these orchards have done very well and today are in good condition and highly productive. It would seem, therefore, that many of the orchard soils, particularly those of more friable texture, lend themselves to this mode of cultivation better than some of the soils of other fruit-growing districts.

Apart from the speed and simplification of cultivation by discing, growers contend that in discing, cover crops and weed roughage are handled better and quicker, they decompose better, and are of more value to the trees than where ploughing is done. Though somewhat of a controversial issue, and likely to remain so for a considerable time, the contention that discing is preferable to ploughing is largely in line with recent overseas investigations and findings.

However, many growers still prefer to give an initial ploughing every second or third year as a safeguard against the development of a hard pan below the surface soil. There is reason to doubt, however, whether this so-called pan is of any special significance, except on easily-compacted clay or heavy soils. The intelligent adoption of practices suitable to the particular soil type being worked must, of course, be the guiding principle.

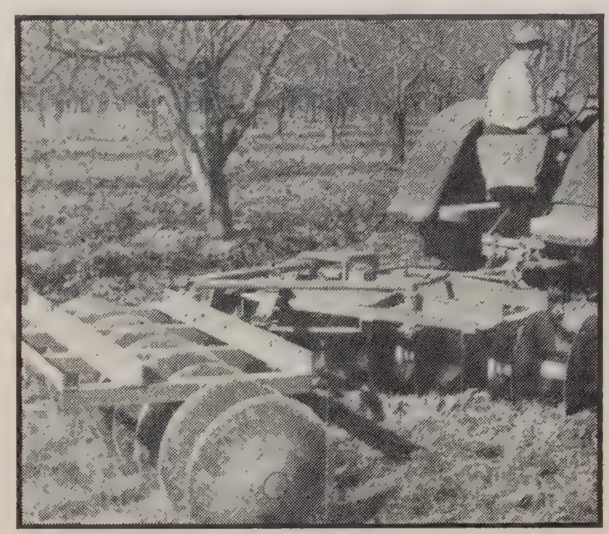
The present trend is toward initial discing, whether a cover crop is grown or not, taking the cuts two and sometimes three ways throughout the orchard. This operation is repeated until reasonable tilth or clearance of weeds or cover crop has been achieved. Subsequent discings and cultivations result in a very clean and satisfactory finish. From then on periodic cultivation is carried out with spring-tined harrows or ordinary tine harrows, as the breaking of the surface crust only, to control weeds and conserve moisture, is the main object. There is a drift away from the continued use of deep-cutting discs during midsummer, as this has tended to induce excessive drying out of orchard soils during hot and dry periods.

Some growers are adopting a system of using a spring-tined cultivator one way throughout the orchard and then of taking cross cuts with tine harrows to knock down the ridging produced by the cultivator and so leave the surface as smooth as possible. The next time the orchard is cultivated the directions of the respective implements are reversed. The objects of this system are to avoid ridging, which tends to expose a greater surface to drying winds and hot sun, to keep the surface flat, and to keep cultivation shallow.

Today in Hawke's Bay the tendency is to cease cultivation earlier in the season than formerly. There are three reasons for the change: 1, the dust nuisance during dry summers; 2, the realisation that the constant re-exposure of the soil to high temperatures during summer is burning a lot of humus out of the soil, thus aggravating the problems of retention of soil moisture and fertility; and 3, the increasing interest in earlier and more consistent sowing of cover crops, or in the natural regeneration of the soil by encouraging weed growth.

The usual practice is to allow light weed growth or a cover crop to become established toward the end of January or about the beginning of February, though the cessation of cultivation about the middle of January does not encourage much weed growth for some time if earlier cultivations have been efficient.

Many growers have recently become interested in sowing down a semi-permanent type of cover crop, particularly of the clover species, as a means of raising soil fertility and improving moisture-holding capacity in orchards.



[*News-photo Service photo.*

A heavy set of true offset discs with two single discs arranged tandem fashion, with each gang operating in an opposing direction.

Some trials along these lines have already been carried out in Nelson, with a fair measure of success. The different soils and climatic conditions in the various districts, however, will have a bearing on the results to be expected from this system, and further experience appears necessary before it can be advocated.

As the main bulk of growth from semi-permanent cover crops will occur in October and November, their extra withdrawal of moisture from the soil in the drier districts may cause some temporary stagnation of tree growth during this vital period. Such stagnation may, however, apply only during the first season or two, until the soil humus content has been built up.

If the semi-permanent cover crop system or similar method became fairly common practice, it is obvious that it might have a bearing on the extent and type of cultivating equipment needed by some growers. Capital outlay on equipment might also be reduced. Any change from accepted methods almost always creates some controversy, but it is necessary to have an open mind on any new development which may assure the regeneration or maintenance of soil fertility by a system which simulates natural processes as closely as possible.

Imported Equipment

Though in recent years spring-tooth cultivators, which are ideal for orchard cultivation, have been difficult to obtain, and even second-hand sets have been scarce, growers have been able to get all other types of equipment. However, the price has been a heavy item.

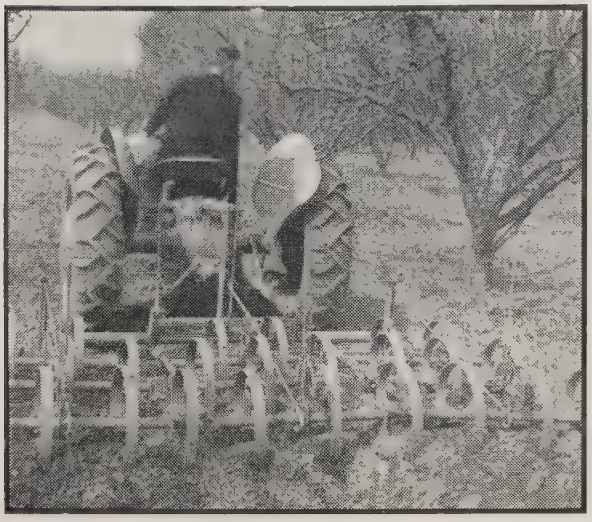
Perhaps partly because of import difficulties no tractor-drawn equipment of a revolutionary design has made its appearance in the last few years and much the same equipment is being used today as was used some years ago, except that many refinements or improvements have been effected.

This does not apply to equipment suitable for small holdings, of which several new types are in use.

Varying Requirements

The size and contour of an orchard largely determine the type of equipment used. For instance, apart from the fact that the owner of a small orchard cannot afford the outlay on large equipment, such equipment would be difficult to handle in a small area. On the other hand to attempt to cultivate a large hillside orchard with a rubber-tyred tractor may be difficult or dangerous and a crawler-type tractor will probably be required. Then, too, the

ORCHARD CULTIVATION METHODS



[*News-photo Service photo.*

A new type of spring-tined cultivator which retains the floating action between the leaves and which can be entirely lifted away from the soil by a hydraulic lift at the rear of the tractor.

nature of the land varies and some orchards may require a heavier type of disc, etc., than others.

In very small orchards a very reasonable outlay on equipment will provide one of the newer types of small powered cultivators which are guided by an operator on foot. The rotary type cultivator comes within this category.

Though the question of the relative merits of horse-drawn implements as against powered types is still of minor significance in some districts, the horse has almost vanished from present-day Hawke's Bay orchards.

The range of cultivation equipment usually preferred by growers for an average-sized commercial orchard in Hawke's Bay consists of a rubber-tyred 4-wheeled tractor, approximately 15-24 h.p., a single- or double-furrow plough, a medium set of tandem offset discs, an orchard-type spring-tined cultivator (3 or 4 leaves), and a set of tine harrows (3 or 4 leaves).

Features of Tractor

As the orchard tractor is used so much for general haulage, apart from cultivation, the rubber-tyred 4-wheeled tractor is usually preferred, because of its adaptability. Some of the essentials of a good orchard tractor are:

1. A well-controlled but flexible and reliable power unit.
2. Convenience, adaptability, and reasonably-quiet performance.
3. Low operating costs and reasonable initial cost.
4. Sturdy and low-geared transmission; wide gear and speed range.
5. Reasonably-low structure, preferably with wheel guards to protect trees from damage.
6. Independent, foot-operated rear brakes to facilitate turning.
7. Variable-hitch, horizontal draw-bar, selfstarter, headlamps, power take-off, and belt pulley.

Detachable wheel weights may also be advisable in heavy soil conditions, to assist traction when ploughing. The new type of mechanical-lift equipment is also worth consideration, as it tends to simplify and facilitate cultivation operations.

Wide Range of Ploughs

There is a wide range of plough types and makes in use in Hawke's Bay orchards and this would appear, in many cases, to be the result of taking the opportunity of securing a plough at reasonable cost rather than choosing the most suitable type for a particular orchard. However, many good and suitable ploughs are in use. To be really satisfactory for orchard work a plough should be of light draught and simply operated; it should be under absolute control from the tractor seat, and adjustments of depth at all three wheels should be effected by means of conveniently-placed hand wheels or levers, low set to avoid damage to the trees. The front and rear wheels should be controlled by automatic steerage, enabling the plough to turn right round almost in its own length, while it is an advantage to have the plough fitted with an automatic lift controlled from the tractor by the driver. The plough should also have provision for varying the width of the furrows and special draw-bar couplings to give a wide range of vertical and horizontal adjustments. As obstructions such as tree roots may be encountered, a spring safety pin or automatic-release hitch attachment is advisable. Offset hitch attachments are necessary to facilitate ploughing close to the trees. The plough should be fitted with steel shares, swivel disc coulters, and medium to long mouldboards. All moving parts should be provided with high-pressure lubrication facilities or efficient grease-cap fittings. One- or 2-furrow ploughs are preferable for most orchards.

The underslung tractor-attachable type of plough so far has proved unsuitable for orchard work, because with it ploughing close to the trees cannot be accomplished satisfactorily.

Modern Orchard Disc

In Hawke's Bay orchards there is probably no implement which varies so much in type, size, condition, and efficiency as the disc or, as it is sometimes called, the disc harrow. The old single-cut, horse-drawn disc has had its day and the modern, highly-efficient tandem type is now very much in evidence. A number of older types, however, are still in use, but are usually confined to the smaller orchards.

Because it helps to meet the insistent demand for thoroughness and couples speed with endurance, the tandem disc is firmly established in popular favour. Indeed, it is one of the essential pieces of equipment to associate with the modern tractor, and if its use is not overdone to the detriment of the orchard, it is a labour-saving and efficient cultivating implement.

The size and weight of tandem discs must depend on the tractor available for haulage. Very large or very heavy discs are usually unsuitable for orchards and may cause damage. They will add to haulage costs and require higher capital outlay. The disc should provide the greatest possible cutting capacity in both sets of the tandem arrangement, each of which moves the soil in an opposing direction. The general effect is a churning motion on the soil. It is essential for discs to be provided with a simple and easy adjustment of the cut, allowing for each gang to be set independently. The rear set, though an integral part of the whole implement, should be secured by universal couplings to enable it to operate efficiently unim-

[*News-photo Service photo.*

The same cultivator as above lifted away from the soil.

paired by the action of the front set, and so contribute materially to intensive and effective cultivation or movement of the soil. The disc should be fitted with an adjustable offset hitch or draw-bar to enable the operator to get reasonably close to trees. Short coupling to the tractor is an advantage where short turns are necessary. An automatic chain attachment or manual rope control for the removal of the cut when turning, etc., should be standard disc equipment, and weight trays over the discs, on which weights can be carried when the soil is hard or when cover crops are being turned in, should be provided. The disc should be low set, and adjusting gear should not be elevated to the extent that it may interfere with tree branches. Disc scrapers should be fitted to prevent clogging in heavy or damp soil.

The discs, which may be in two sets of double gangs or two sets of single gangs (the true offset type), should be heat treated and capable of maintaining a good cutting edge. All main bearings should be fitted with high-pressure lubrication facilities.

Spring-tooth Cultivators

No orchard implement is so widely favoured as the spring-tooth cultivator, and because of its efficiency and general suitability in friable soils, it is extensively used in Hawke's Bay. Though there are slight variations in structure, the main principles are adhered to strictly. The cultivator usually consists of a set of 3 or 4 leaves (depending on the size of the orchard and the power of the tractor to be used) of separate units linked. The implement is very suitable for use during summer, when shallow stirring of the soil only is preferable. The cultivator is very satisfactory for working the soil to a good tilth and in levelling the surface subsequent to initial discing. The frame of the implement slides along the ground and thus controls the set of the teeth, which can be varied in depth by convenient levers.

A feature of the implement is that it has separate units, each of 8 to 12 spring-tooth or hooped tines, which are replaceable or can be purchased to suit requirements. The cultivator frame should have replaceable or reinforced runners, as this part of the implement wears freely from friction with the ground. Depth control levers must be standard equipment on each leaf, and for tractor use these levers should be attached to the front of the cultivator for the convenience of the driver. The levers of the horse-drawn type, which is still used to a considerable extent today with tractor haulage, face the rear for the convenience of the horse driver.

The main cross bars of the cultivator are made of round piping to which the hooped tines are mounted with U bolts so that the strain is on the pipe and not the bolts. The hooped tines may vary in the structure of the points, but a reversible and replaceable point is an advantage.

Newer types of spring-tooth cultivators better suited to tractor haulage are now being evolved by which the tractor driver is able to control working depth by means of a rope attachment. Reversing the tractor locks the cultivator at any desired depth. The new cultivators are also made in one sturdy and complete unit instead of the small separate units of the older types.

Tine Harrows

The ordinary tine harrow is so well known and has varied so little over the years that a detailed description should not be necessary. However, there are usually two main types of leaves—zig-zag and diamond. Heavyweight, square steel tines, of which each leaf has 20, are preferable. Sets of 3 or 4 leaves (each 3ft. 4in. to 3ft. 6in. wide) are usual, each leaf being attached from two points to a straight, wooden draw-bar or swingletree.

Though the tine harrow is effective for various tillage purposes, it is not widely used in Hawke's Bay orchards, where the spring-tooth cultivator generally replaces it.

Other Cultivating Equipment

There are numerous other types of cultivators in use, but reference in this instance has been restricted to the popular types, and it is not intended to make special reference to the large, direct tractor-attached rotary hoe, as its use in Hawke's Bay is very limited. In fact, it is not considered a really-suitable implement for orchard cultivation, because it is rather cumbersome to use, it tends to create a compacted lower soil layer, and it cannot be operated close to trees.

[News-photo Service photo.

Low-set, 3-furrow orchard plough fitted with mechanical lift and offset draw-bar. Note the adjusting equipment clear of the trees.

Choice of Equipment

A sound choice of cultivating equipment for a 10- to 15-acre orchard under Hawke's Bay conditions would be:

Tractor: Four-wheeled, rubber-tyred, 18-20 h.p. tractor with power take-off and belt pulley, selfstarter, electric light, low bottom gear, wide gear range, low-set structure, independent rear brakes, and variable-hitch draw-bar.

Plough: Double furrow, light draught, automatic steerage, automatic lift, controlled from tractor, wide-range vertical and horizontal adjustments, safety-spring attachment, offset hitch, steel shares, swivel disc coulters, and medium-length mouldboards.

Discs: Offset tandem type 7½ft. wide; two single gangs each of 10 discs; rugged, low-set construction; independent, set gangs secured by universal couplings; offset drawbar; automatic or manual control from tractor; weight trays, disc scrapers, and heat-treated discs.

Spring-tooth cultivator: New, single unit, tractor type carrying 25 spring-hooped tines; rugged structure and manual depth control from tractor.

Tine harrows: Three leaves of diamond type, heavyweight, square steel tines; two-point attachment for each leaf to a long draw-bar.

With a range of equipment such as that described a 10- to 15-acre orchard can be cultivated efficiently, speedily, and economically, and there would be no unnecessary outlay of capital.

Care of Implements

Orchard equipment must be kept in good repair and well housed. Today, when equipment costs more, greater care than previously is essential, to prolong the efficient working life of equipment. In addition to maintenance during the busy season general overhaul and painting should be done during the winter. Through such attention breakdowns are often averted at busy periods. Too often expensive and essential equipment is left outside for long periods, either totally or partially exposed to the weather, resulting in serious deterioration. Often the man who can least afford to neglect equipment is the worst offender.

Proper maintenance includes protection from the weather (preferably by shed housing), regular lubrication, adjustment and replacement of parts, prevention of rust and deterioration by periodic painting, and tuning up and checking performance at frequent intervals. Owners of equipment should set an example to employees in this respect and ensure that an ample supply of material and tools, well arranged at a central depot or shed, is available for the purpose.

Stabilise YOUR Farm Income

Grow LINSEED

NEXT SEASON at a . . .

Guaranteed Price

Plan to Plough Your Linseed Area EARLY

it Pays

CONSULT YOUR MERCHANT . . .
the Company's Field Representatives are available in all Districts to assist you.

DOMINION INDUSTRIES LTD.
Seed Procurement Division.
HEAD OFFICE: ASHBURTON.
'Phone 846, Box 34.

FIRST CHOICE OF NEW ZEALAND FARMERS

ENGLISH Fordson MAJOR

With Steel Wheels - - - - - - from £366
With Pneumatic Tyres - - - - - - from £405
With D.G. Half-Track Equipment - - - from £698

Backed by unsurpassed Service and Parts Facilities at 80 Ford Dealers.

143.9

Back on the Market again
TOMOANA PIG PORRIDGE
To winter your pigs better

Towards the end of last year Regulations again prohibited the feeding of fats to pigs owing to the world fat shortage. As a result, TOMOANA PIG PORRIDGE was withdrawn from the market.

Now you can again get supplies of TOMOANA PIG PORRIDGE with the suspension of these regulations.

TOMOANA PIG PORRIDGE has more food value than molasses and a greater starch equivalent than barley, weight for weight.

Why
TOMOANA
PIG PORRIDGE
WINTERS PIGS
better!

TOMOANA PIG PORRIDGE is a scientifically prepared food emulsion containing blended food-fats and fat soluble vitamins. It mixes readily with skim, whey or water, and is of special value in wintering pigs — the ideal food because it powerfully aids resistance to disease.

For further information write to:
W. & R. FLETCHER (N.Z.) LTD., Box 663, Wellington.

Ask your Produce Merchant for
TOMOANA PIG PORRIDGE

PRICE In spite of increased costs, greater turnover enables the price to be maintained the same as last year. The price for the standardised 44 gallon drum of TOMOANA PIG PORRIDGE is £3-19-6
f.o.r. Westfield, Drum included

SUBTERRANEAN CLOVER AS A FERTILITY BUILDER

Use on Steward Settlement, North Otago

By A. J. COUGHLAN, Fields Instructor, Department of Agriculture, Oamaru.

SOIL fertility and carrying capacity have been increased during recent years over much of the lighter and higher elevated areas of the Steward Settlement on the south bank of the Waitaki River and extending from the mouth to the vicinity of Aitchesons railway station. The soil is of the stony silt loam type overlying the old bed of the Waitaki River, which forms the northern boundary between North Otago and South Canterbury. As the average rainfall is in the vicinity of 20in. per annum, and is not well distributed, the area is subject to long dry spells in summer. This area would appear to be about the southern limit of successful general use of subterranean clover on account of excessive ground frosts and short growing period.

THE Steward Settlement, of approximately 23,000 acres, was formerly known as the Waitaki Plains Estate. It was surveyed and opened for selection in 1906. The contour is uneven and broken by old river terraces and the soil is very thin in places. The original cover of shrub and silver tussock and fescue tussock provided sparse herbage for grazing animals. Before its subdivision the country provided wool and store sheep, but as time went on the grazing policy was modified by the introduction of forage crops for sheep. The main crops grown were turnips and rape, with oats for chaff and grain.

Basis of Nitrogen Supply

Under closer settlement the policy of farm management is to secure higher-producing pastures, which necessitates building up the fertility of the soil to allow the higher-fertility-demanding grasses and clovers to subsist. The surest and most economical method to secure this is through the employment of the subterranean clover plant as the basis of nitrogen supply.

Clovers are essential in good grazing pastures, supplying nitrogen to the grasses, increasing the mineral content of the herbage, and building up the organic content of the soil; fertility is thereby improved, and subterranean clover is outstanding in this respect. It has the capacity to grow well on light soil and builds up fertility to such an extent that in a relatively short time ryegrass and other high-producing pasture plants will thrive where previously they would not persist.

Introduction on Settlement

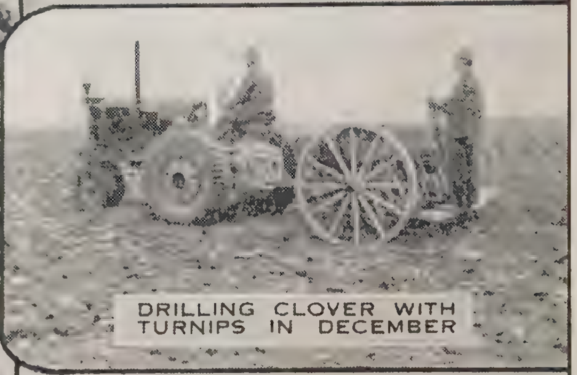
Subterranean clover was introduced on the settlement in 1931 by Mr. F. R. Saunders, who originally came from Australia and had seen the plant growing on similar country there. He included ½lb. of this clover in a mixture he used to lay down a 32-acre pasture. The seed established well, but owing to the very light seeding it took a long time to thicken up. However, he was encouraged by the result and increased the area sown year by year. Mr. Saunders found by his own experience, together with experience gained through co-operative field trials laid down on his property by the Department of Agriculture, that by increasing the seeding rate from ½lb. to 5 to 6lb. per acre and at the same time applying carbonate of lime and superphosphate, at the rate of 1 ton and 1cwt. respectively per acre, a rapid establishment was secured and the carrying capacity very much increased. Neighbouring farmers became interested and observed the results closely.

Experimental trials embodying the Mt. Barker, Tallarook, Dwalganup, and Marlborough strains were laid down on the settlement by the Department of Agriculture in 1937 and were under experimental observation until 1941. It was found that all strains established well in the early stages of the trial. Mt. Barker gave the earliest feed, while the Tallarook strain, which is 2 to 3 weeks later, provided much more feed in late spring and was superior to the Marlborough and Dwalganup strains. The Dwalganup strain did not show good results and its use is not recommended on this type of country. All strains showed a marked response to applications of superphosphate and lime.

The contour of the Steward Settlement is uneven and broken by old river terraces and the soil is very thin in places.

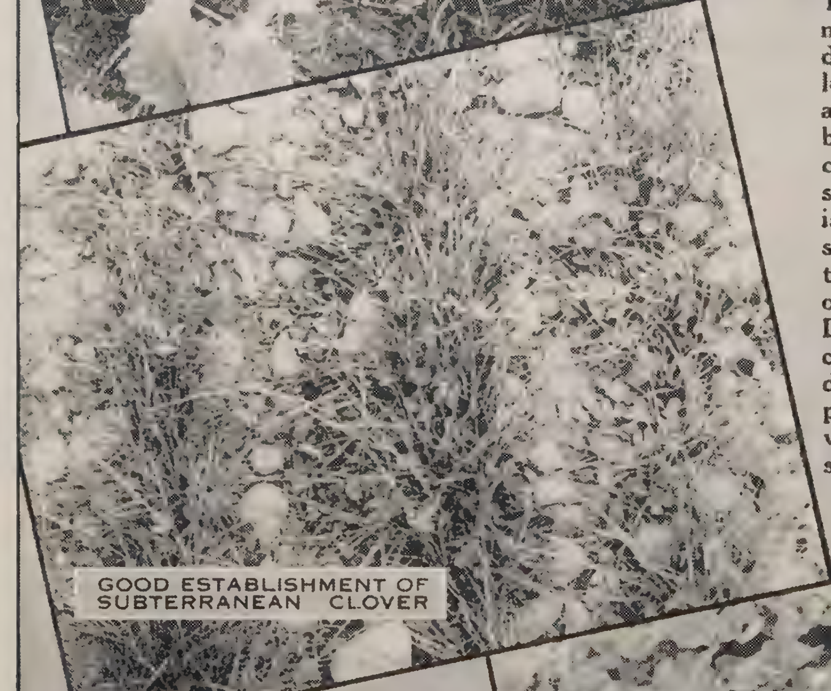
SUBTERRANEAN CLOVER ON STEWARD SETTLEMENT

SUBTERRANEAN CLOVER ESTABLISHED WITH RYEGRASS AND TURNIP COVER

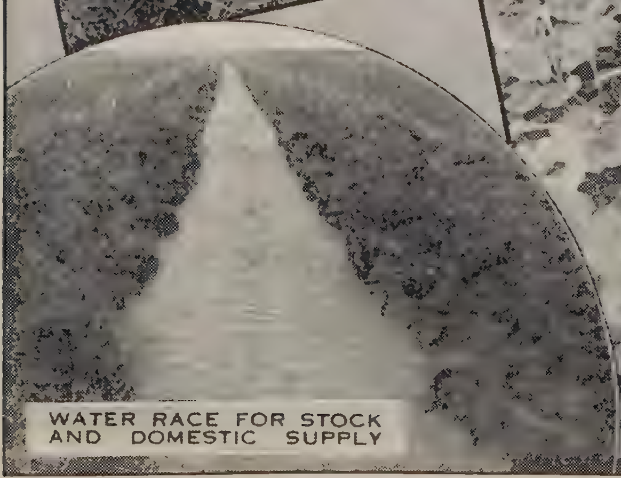


DRILLING CLOVER WITH TURNIPS IN DECEMBER

The surest and most economical method of securing higher-producing pastures on the stony silt loam under conditions of low annual rainfall unevenly distributed is by using subterranean clover as the basis of nitrogen supply to build up fertility. It is now general to include 3lb. of subterranean clover in the pasture mixture or to drill 5 to 6lb. of seed with turnips sown in December. With subterranean clover established, high-fertility-demanding grasses are able to persist, and areas which previously carried only ½ to 1 sheep per acre now carry 2 to 3.



GOOD ESTABLISHMENT OF SUBTERRANEAN CLOVER



WATER RACE FOR STOCK AND DOMESTIC SUPPLY

PURE SWARD OF SUBTERRANEAN CLOVER

However, it is only in the last 4 to 5 years that the real value of subterranean clover has become apparent to the general farming community, and it is now becoming general practice to include 3lb. of subterranean clover in the pasture mixture or to establish a subterranean clover pasture by drilling in about 5 to 6lb. of seed with the turnip crop sown in December.

With subterranean clover established and fertility built up, perennial ryegrass, cocksfoot, crested dogstail, and Montgomery red clover and white clover are able to persist, and consequently areas which previously carried only ⅓ to 1 sheep per acre are now able to carry 2 to 3 sheep per acre.

Characteristics of Plant

Subterranean clover (*Trifolium subterraneum*) is a low-growing annual producing a dense growth from the crown. In the spring it develops long runners which spread over the surface of the ground. Flower heads are produced at intervals along the runners, and when ripe they turn down, burying the seeds in the ground. It is from this characteristic that the plant derives its name. Each flower head possesses three or four florets, each of which produces a single seed. When the seed has ripened in December to early January the plant dies off, leaving no green feed for the dry part of the autumn.

The green herbage is palatable and nutritious and cattle and sheep thrive on it, though it is advisable to provide some dry feed to balance this protein-rich clover when it is in a succulent state. In its dried-off state it forms a natural hay which has considerable feeding value and dry stock do well on it during summer and autumn.

Special Care in First Year

As the plant is an annual, it is dependent on reseeding for its existence. Special grazing management is required in the first year to allow it to reseed, and stock should not be allowed to graze on it during the flowering stage. After its first year of establishment this precaution is not necessary.

If seed is sown in December with the turnip crop, as is the general practice on the settlement, the plant establishes itself well and makes good growth without flowering; it provides feed right through the winter and comes away with a great burst of growth in the spring, to set seed in midsummer.

If seed is sown in the spring, the plant flowers in the following autumn and often dies before the seed is mature.

Fitting in with Farm Practice

Subterranean clover provides little feed in the form of green herbage from December till the seeds germinate after autumn rains supply sufficient moisture. In a mild autumn with sufficient rains the young plants establish well and supply feed right through the winter and provide a rush of growth in the spring, but when a dry autumn is experienced the young plants fail to get a good hold before frosts occur and consequently suffer damage from frost lift. A week of heavy frosts may destroy a large number of plants, and consequently the clover will provide little or no feed till the end of August or September.

Where there has been surplus growth during spring and summer the dried-off herbage will be available for sheep, whose feed demands are not great at this time. It may, however, still be necessary to grow forage crops such as rape, turnips, greenfeed oats, barley, or Italian or short-rotation ryegrass to cater for this period.

A stand of lucerne fits in well with subterranean clover, as it provides grazing in summer in addition to hay for winter. New Zealand Green Globe turnips sown in December with subterranean clover provide for late winter until the main subterranean pasture is sufficiently well advanced to provide grazing for stock. A mixture of cocksfoot and Montgomery red clover and white clover supplies feed when the subterranean clover goes off. These paddocks should be lightly grazed in spring and early summer, when the subterranean clover is being grazed, and this spell enables these pastures to be reserved for midsummer use.

Methods of Establishment

The method usually adopted in the establishment of a subterranean clover pasture is to sow down with the turnip crop in December. The subterranean clover seed is mixed with superphosphate or reverted superphosphate at the rate of 5lb. to 6lb. per acre. Because of the possibility of injury to seed, reverted superphosphate is recommended. Sowing with turnips in December has proved very satisfactory, because the clover then shows no tendency to flower and die as is the case if sown in the spring. The trampling incidental to feeding off of the turnips tends to prevent frost lift.

Farmers have found that the best establishments are obtained by shallow drilling of the seed with 1cwt. of superphosphate or reverted superphosphate per acre. This is well accomplished when the seed is sown with the turnip crop, but if sown with greenfeed oats or barley, which also has proved successful, it is a good plan to drill the oats, harrow and roll, and then cross-drill the subterranean clover, taking special care to avoid burying the seed too deep. Usually half the superphosphate may be sown with the oats and the other half with the subterranean clover seed. Superphosphate does not appear to harm the germination of the subterranean clover seed. In all cases it is advisable to topdress with 1 ton per acre of carbonate of lime before sowing.

The feeding off of the crop tends to give the young clover plants a good firm hold. The area must remain ungrazed or very lightly stocked during November and December to allow setting of the seed. Restraint in grazing is not necessary in subsequent years, as there will always be a reserve of "hard" seed in the ground, and there will also be some seed setting even under normal grazing.

Subterranean clover may be sown under a cereal crop for grain, provided this is done not later than March. Later sowings may result in frost lift of the clover. During the maturing and ripening of the cereal crop the clover plants are free to develop and set a considerable quantity of seed. It is also possible to establish subterranean clover by surface introduction by surface working the ground with the one-way discs or by grubbing and drilling the seed in with superphosphate and lime or reverted superphosphate not later than March to allow the young plants to get a good root hold before winter frosts occur.

Broadcasting of the seed is satisfactory on a well-prepared seed-bed under ideal conditions, provided the land has received an initial dressing of lime and superphosphate, but drilling usually gives more reliable results and after the first year's seeding the spaces between the drills are filled in.

Subterranean clover in pasture mixtures is most successfully established in early autumn on land which has had a summer fallow after a greenfeed crop. The soil is then in good heart and the clover plant may obtain a good root hold before winter; the plants then get away well as soon as the ground warms up in spring.

Superphosphate and Lime Essential

To maintain subterranean pasture on the light land of the settlement it is most essential to apply both lime and superphosphate together. The response to superphosphate alone is often disappointing and there is clear evidence that for good results the two should be used in conjunction. One ton of carbonate of lime and 1cwt. of superphosphate should be the initial application, and after this 10cwt. of lime and 1cwt. of superphosphate in alternate years will maintain the pasture.

Water Supply

This country has always been at a very great disadvantage through having no natural water supply. The present supply is taken from the Waitaki River, the intake to the race being situated near Black Point. The race is controlled by the Waitaki County Council and was designed to supply domestic and stock needs and the Waitaki Farmers' freezing works at Pukeuri.

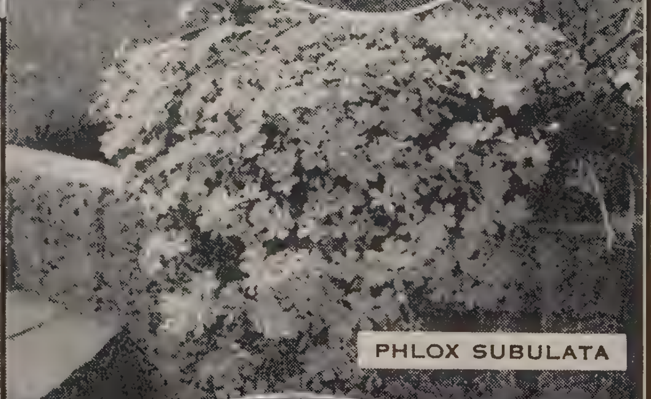
If irrigation were properly established on the Steward Settlement, there would not be the same need for the use of subterranean clover as a soil builder. Irrigation would place the farmer in the position of being able to sow down his pastures with the better strains of grasses and clovers and enable him to increase the carrying capacity and maintain a high standard of soil fertility. Under the present dry-farming conditions subterranean clover is the most valuable pasture species and its use should be extended.

COLOUR AND VARIETY IN THE MIXED FLOWER BORDER

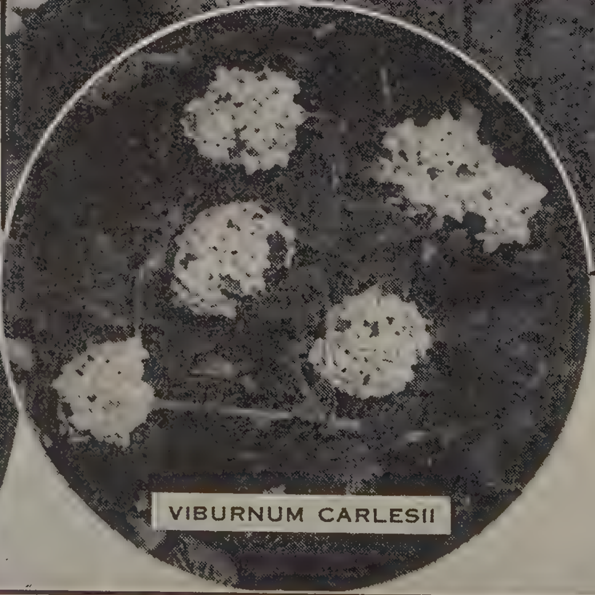
LILIUM AURATUM PLATYPHYLLUM

BOUGAINVILLEA MAGNIFICA TRAILII

The yellow and purple markings of *Lilium auratum* make vivid splashes in the border, and a cascade of unusual colour can be achieved in late spring with the salmon-pink flowers of alpine phlox. The flowers of *Viburnum carlesii* are very fragrant and the pink manuka makes a fine show in October. Bougainvillea is an attractive climber to cover a fence or wall, but is not hardy everywhere.


PHLOX SUBULATA

LEPTOSPERMUM SCOPARIUM


VIBURNUM CARLESII

[*Douglas Elliott photos.*

PLANNING AND PLANTING THE MIXED BORDER

THE average New Zealand gardener has a limited area at his disposal for the culture of flowering shrubs and plants; that portion of the section at the rear of the dwelling is in most cases devoted to fruit and vegetable growing, and the flower garden enthusiast is therefore obliged to plant most of his flowers in front of the home. If he wants a good display of colour to keep the garden bright throughout the year, the best plan is to plant mixed borders containing shrubs, herbaceous perennials, bulbs, annuals, and biennials, and in this article H. P. Thomas, Horticultural Inspector, Department of Agriculture, Palmerston North, gives advice on the selection and culture of subjects and the planning of their display to the best advantage.

[*Elmar Studios photo.*

UNFORTUNATELY restriction of space often encourages gardeners to plant too closely, with the result that in a few years beds are overcrowded with an assortment of subjects which through competition for food and space do not give of their best. Too often home garden borders are packed with overgrown, "leggy" trees and shrubs which have taken charge of the area, and this conveys an impression of neglect and untidiness to what may be an otherwise attractive residence. Plants may also come to this condition through neglect of pruning or lack of knowledge on the part of most householders of plant requirements and their ultimate heights.

A garden should be considered as an extension of the home out-of-doors, and if this idea is to be developed, forethought and a knowledge of border plant requirements and their habits are very necessary.

Background and Aspect

A northerly or easterly aspect for a border is preferable, but if shelter in the form of shrubs, hedge, or wall is provided against prevailing winds, most positions will give good results. Apart from the necessary shelter, an open, sunny situation away from roots or drips of trees is best for most flowers, but a few, such as rhododendrons, hydrangeas, aucuba, heuchera, and *Anemone japonica*, will succeed in semi-shaded conditions.

In most home gardens the lawn takes pride of place, and borders or beds are usually formed along the frontage of the section and on either or both boundaries; if the house is set well back on the section, a border may occupy one or both sides of the driveway. Though in many cases a choice of lay-out is limited, much can be accomplished when details such as shelter, preparation of the soil, and general maintenance are carefully thought out. Shrubs provide an excellent background to the herbaceous border and, because of their moderate size and greater variety of flower, are more valuable than trees for small gardens.

To provide shelter a live hedge of a compact nature, such as *Lonicera nitida* or *Abelia floribunda*, is advisable, even though the border includes some shrubs, as draughts are then to a great extent overcome. If the garden is bounded by wooden or iron fences, these may be screened by a suitable hedge or shrubs if room permits, or by choice climbers if space is limited.

Preparation

The ideal soil requirement for most shrubs and border plants is a rich, medium. well-drained loam, but relatively few gardeners are fortunate enough to have such a soil. Less-favourable sites can often be improved by providing correct drainage. Most borders in the home garden are of a permanent or semi-permanent nature, and their success depends greatly on the thoroughness of their initial preparation. The site or sites chosen should be dug over to a depth of at least 2ft. and the second spit or layer broken up with a fork and manure added, but on no account should the second layer be brought to the surface.

The type of manure used depends on the nature of the soil being cultivated. On light soils well-decomposed farmyard manure is ideal, but as this is seldom obtainable by city gardeners, clay, leaf-mould, or decayed vegetable matter from the compost heap should be liberally supplied to improve soil texture and fertility. On heavy clay soils long, strawy manure, compost, wood ashes, coarse sand, and road grit can be used not only as a manure, but also to keep the soil open to facilitate drainage and aeration so that a better tilth is obtained for plant growth.

Planting

Shrubs and perennials may be planted over a period of several months beginning from late autumn (April) to early spring (September) if the soil is in workable condition. For several reasons planting is better done in autumn in colder districts, as the soil is then in more friable condition, plants have a reasonable chance of becoming established before winter sets in, and a better selection is to be had from nurserymen. Spring-flowering bulbs should be planted up during February and March. During October

ARRANGEMENT OF THE MIXED BORDER

[*Douglas Elliott photo.*

***Camellia japonica* and hybrids of the variety bear a mass of flowers in winter, and the evergreen foliage of the compact bushes makes them attractive features of the border. The Czar, the variety illustrated, has a beautiful semi-double flower with crimson petals and gold stamens; height 8 to 10ft.**

seeds of hardy annuals may be sown thinly in open borders between subjects which have finished flowering, or in spaces reserved for this purpose when the border was planned. In addition box-grown hardy and half-hardy annuals (bedding plants) can be planted out in spring. Half-hardy annuals are sown from July under glass and planted out in the open when all likelihood of frost is past. Most commercial growers of bedding plants also raise many of the hardy annuals from seed sown under glass, as most of these transplant readily and make sturdy plants when grown in boxes.

Many gardeners prefer to grow their own bedding plants, and this is undoubtedly more economical where large numbers of plants are required. Varieties which do not transplant easily and are better sown broadcast in the border and later thinned to give each plant ample room for development are *Mathiola bicornis* (night-scented stock), mignonette, nasturtium, shirley poppy, virginian stock, *Linum grandiflorum*, and linaria. Biennials and perennials for planting out in autumn are usually sown from November to January, either in prepared beds in the open ground, or preferably in boxes to prevent interference by pests, weather, and weeds. Biennials are useful to provide a brilliant display from early spring until their place is taken by annuals.

Planting distances should generally be governed by the ultimate height of the plants. For example, plants up to 18in. high should be planted 1ft. apart, those 18in. to 2½ft. high 2ft. apart, and those 2½ft. to 4ft. or more high not less than 3ft. apart. Shrubs recommended for borders should not be planted less than 6ft. apart, unless it is intended to use them as shelter, when they can be spaced as close as 3ft. The necessary knowledge of habit of growth, blooming date, and colour of flowers of plants to be used can be obtained from reliable gardening books, nurserymen's catalogues, or from general observation during the growing season. Space must also be allowed for staking and working among the plants, and any errors in the arrangement should be noted for remedying the following autumn.

Plan

It is worth while sketching on paper the proposed lay-out of the border, after which the area may be measured out and places where the plants are to go marked with pegs. By marking in on the plan the names of the kinds of plants when the border is completed a permanent record is obtained.

Arrangement

There are many ways of arranging a flower border, from all of which something can be learnt. As a continuous display of flowers is the aim of most home gardeners, the blooming periods of flower plants or shrubs selected must cover as many months of the year as possible. If the border can be made from 10 to 12ft. wide, a row of shrubs could be accommodated at the back and about two-thirds of the bed reserved for perennials and bulbs supplemented by bedding plants. If the border cannot be made wide enough to accommodate all these, and more space is available elsewhere for beds, it may be better to have one bed devoted to shrubs alone and another for perennials and bedding plants, in which case the shrubs confined to a separate border can be profitably interplanted with other showy perennial or annual plants for the first year or two.

Large trees should not be planted in average town sections because of their possible hazards to buildings and the possible detrimental effect on lawns and garden plants of their shade and impoverishment of the ground by the gradual encroachment of their roots. As borders are usually made in the front of a house, the position of the house on the section affects arrangements that can be made for the beautification of the area; the front or edge of the border may curve gently or may be straight, according to the general lay-out of the garden. To prevent formality some of the tall plants usually allotted to the back of the border may be brought toward the front to form bays which can be occupied by dwarfer plants.

The grouping of several plants of one variety in large borders is frequently more effective and gives more colour than if they were planted as single specimens, but this can be carried out to advantage only if the border is extensive. As many early-flowering herbaceous plants are dwarf, their natural position is in groups of irregular outline near the front of the border, interplanted with spring-flowering bulbs.

Frequent plantings of annual bedding plants during spring will assure a continuous display of colour in summer and autumn.

Care and Maintenance

Regular attention must be given at various times to pruning, thinning, staking and tying, cultivation, and the removal of flower heads and dead stems.

Herbaceous plants should be carefully staked before the plants become too large, but it is important to use stakes a little shorter than the height of the plants when fully grown, so that the display is not marred by the unsightliness of protruding stakes.

Withered flowers should be removed as soon as they fade so that later-flowering sorts bloom in tidy surroundings. As the sap from the top growth returns to strengthen the crown from which the following season's growth is produced, it is advisable first to remove only the finished flower heads and to cut back

[Douglas Elliott photo.

The brilliant colours of some of the hybrid flowering brooms *(Cytisus)* make them excellent background subjects for the border. They are very hardy.

the stems later. If the old stems are dragged at instead of being cut cleanly, the crowns will be injured and future growth retarded. The tops of all herbaceous plants should be allowed to ripen off, particularly bulbous and tuberous kinds.

Healthy prunings from herbaceous plants provide useful material for building up the compost heap, but if they are badly diseased they are better burned.

Most herbaceous plants should be lifted every two or three years and those which have become too large should be divided. If this periodic lifting is neglected, clumps get too large and produce only stunted shoots and smaller flowers. Lifting is done in autumn and young, vigorous growths from the outside of clumps should be chosen for replanting.

Perennials too large and compact to pull apart by hand can be divided with the aid of two large garden forks with prongs placed back to back, the handles being levered inward to tear the roots apart. In some cases a knife cut is needed to divide the clumps, but care should be taken to avoid unnecessary damage to roots.

Vacant areas can be dug over and replenished with material and manures required by the type of soil, and if weather and soil conditions are suitable, the newly-selected plants can be replanted immediately.

In seasons between periodic thorough overhaul of the border a light dressing of farmyard manure or decayed vegetable matter from the compost heap forked around the plants and shrubs during autumn or early spring is beneficial.

Some subjects, such as paeonies, tritoma, gypsophila, geums, heuchera, lupins, anchusa, and oriental poppies, resent disturbance, and if the clumps show no sign of deterioration, it is not necessary to take them up as regularly as others.

During early spring it is advisable to remove or thin some of the growth of the more vigorous varieties such as delphiniums, michaelmas daisies, perennial phlox, rudbeckias, and heleniums; if excess growth is allowed, smaller flowers will result.

[Douglas Elliott photo.

Varieties of lilac *(Syringa vulgaris)* may be had in various colours with single and double flowers. The shrubs flower prolifically in spring and are attractive specimens for the border.

If plants which cease flowering early, such as lupins, pyrethrum, trollius, doronicums, and delphiniums, are cut back immediately the flowers are over, they may be induced to make second growth, which often produces a second flowering in the autumn. This second flowering is considered to be less exhausting to the plant than the development and ripening of seed heads, which should not be allowed to form.

Hoeing should be commenced as soon as the soil is dry enough in spring and continued until autumn to maintain a free, open soil and to control weeds.

Pruning

It is necessary for the average home gardener whose space is restricted to have some knowledge of how and when to prune shrubs, as most of them require some pruning, not only to maintain their appearance, but to encourage growth for future blossoming, which is even more important.

From evergreen shrubs it is often necessary to remove only dead, diseased, or misplaced branches between late summer and mid-winter. The season of flowering governs the pruning of flowering kinds, which may be divided into two main groups:—

1. **Those that flower on the wood of the previous season's growth:—**

   Shoots of early-spring-flowering varieties of this group, for example forsythia, *Ribes*, and *Cytisus*, are cut back to 2 or 3 buds immediately after flowering.

   Varieties in this group which flower in early summer, such as philadelphus, deutzia, diervilla, *Hydrangea hortensis*, and *Kerria japonica*, are pruned after some growth has been made.

   Old flowering shoots and weak wood of all varieties in this group are thinned out after flowering, but young growths are allowed to ripen without being cut.

2. **Those that flower on the wood of the current season:—**

   Examples of this group are *Buddleia variabilis*, *Hydrangea paniculata*, *Tamarix gallica*, and spiraeas, the flowering shoots of which should be pruned back to 2 buds in autumn or winter.

Pruning of rhododendrons and azaleas consists only of removing the old flower heads before the seed develops.

It is desirable to have a clean stem at the base of deciduous trees and it is usual to remove a third of the lower branches as the trees grow.

SPRAYING EXPERIMENTS FOR CONTROL

FROM the early days of land settlement the New Zealand grass-grub has been recognised as a most destructive pest of pastures throughout the Dominion. The great development of grassland farming must have favoured the spread of this pest because, though the population may be low, the presence of grass-grub is fairly general throughout the sown grasslands. Of 28 native species, *Odontria zealandica* is the most common and destructive. This article by E. M. Bates, Instructor in Agriculture, Hawera, describes experiments for the control of the pest in south Taranaki.

THE light to medium lands of the Canterbury Plains suffer severely from grass-grub infestations, but outbreaks occur in other parts of New Zealand. As a result of severe attack pastures may be partially or completely destroyed, with consequent lowering of production, causing serious management problems and loss of income to farmers.

Damage to pastures is most severe in the dry autumn period when the grubs are feeding actively. If numerous in the soil, they eat the roots of grasses, especially ryegrass, to such an extent that the turf can be rolled back like a mat. In the South Island, because of cold and dry winter conditions, such pastures usually have to be resown, but in the North Island, where conditions are warmer and more humid, pastures in the main recover eventually, though in dry weather badly-damaged grass has little chance of rerooting.

Infestation in South Taranaki

Grass-grub is present in pastures throughout south Taranaki, but during the past 10 years an epidemic of the pest has gradually worked south through a block of sandy country from about Lowgarth, through Mangatoki, Matapu, and Te Roti, and then fanned out eastward in the Rotokare-Fraser Road area. The infestation follows sandy types of land away from the heavier, silty loam of the coastal strip below Normanby. A similar soil type to that of the land already damaged by the grub extends through Ararata, Mere Mere, Ohangai, Whakamara, and Matukaroa, and future infestations may occur in this direction.

The centre of infestation has moved about a mile a year, upward of 1000 acres being severely affected each year. Infested farms appear to remain badly affected, according to the severity of attack, for from 3 to 5 years. Experience with the grub on these farms is much the same, except that on the outskirts of the infestation damage is partial.

The droning flight of the beetle in November gives the first intimation of an impending infestation. In the first year of attack patches of damaged pasture in lighter, less consolidated parts of paddocks become obvious about the end of February, the patches increasing in size by winter. During the next few years grubs attack the rest of the pasture, and when the infestation is over little, if any, of the farm pasture remains undamaged.

Pastures which have been eaten out by the grub and have recovered appear to be free from severe infestation for a number of years. The reason remains unexplained; possibly food supplies in the soil are insufficient to encourage egg laying, or the topsoil may become toxic after a heavy infestation. In some cases damaged pasture, ploughed and regrassed, even after two crops, has been reinfested after the first year, though severe infestation of the remainder of the farm has ceased.

Consolidation and Oversowing

For recovery of damaged pasture under suitable climatic conditions consolidation of the pulverised soil is essential. Even cocksfoot and white clover in the loosened soil are likely to be pulled out by grazing stock. Feeding of hay on affected paddocks, in the normal routine during winter and early spring, brings about the consolidation essential for rerooting of damaged grass and recovery generally.

If a large proportion of the farm paddocks is damaged, stocking is limited unless travelling stock can be used, but heavy rolling and some reseeding in late autumn hasten recovery. Good results after consolidation have been obtained by oversowing up to 30lb. of ryegrass and white clover seed per acre, with 2 or 3cwt. of superphosphate, and closing the paddock until spring. Unfortunately, temporary loss of carrying capacity and lowered income are a deterrent, and south Taranaki farmers usually do not sow after a grass-grub infestation.

Damaged pastures should not be harrowed, even for spreading stock droppings, as the turf is easily pulled away, leaving paddocks rough.

Cropping on Affected Areas

Small areas in swedes and chou moellier have been grown on affected farms, but many farmers have depended solely on hay, largely bought in. Butterfat production usually falls to 10 to 25 per cent. below normal and stock do not thrive.

During the past 2 years several farmers in the Fraser Road area, with the aid of swedes and chou moellier as winter feed and kale for autumn feed, have maintained production fairly well despite the grub. Each crop is fed off and disced for the new seed-bed before grass is sown in autumn. No infestation takes place until the following November, when the young sward, being vigorous, is able to withstand the grass-grub attack, but in later seasons grass-grub effect can be expected.

One prominent farmer has autumn-sown temporary pasture for winter feed, and a hay crop will be taken before the land is ploughed again for

OF GRASS-GRUB IN SOUTH TARANAKI

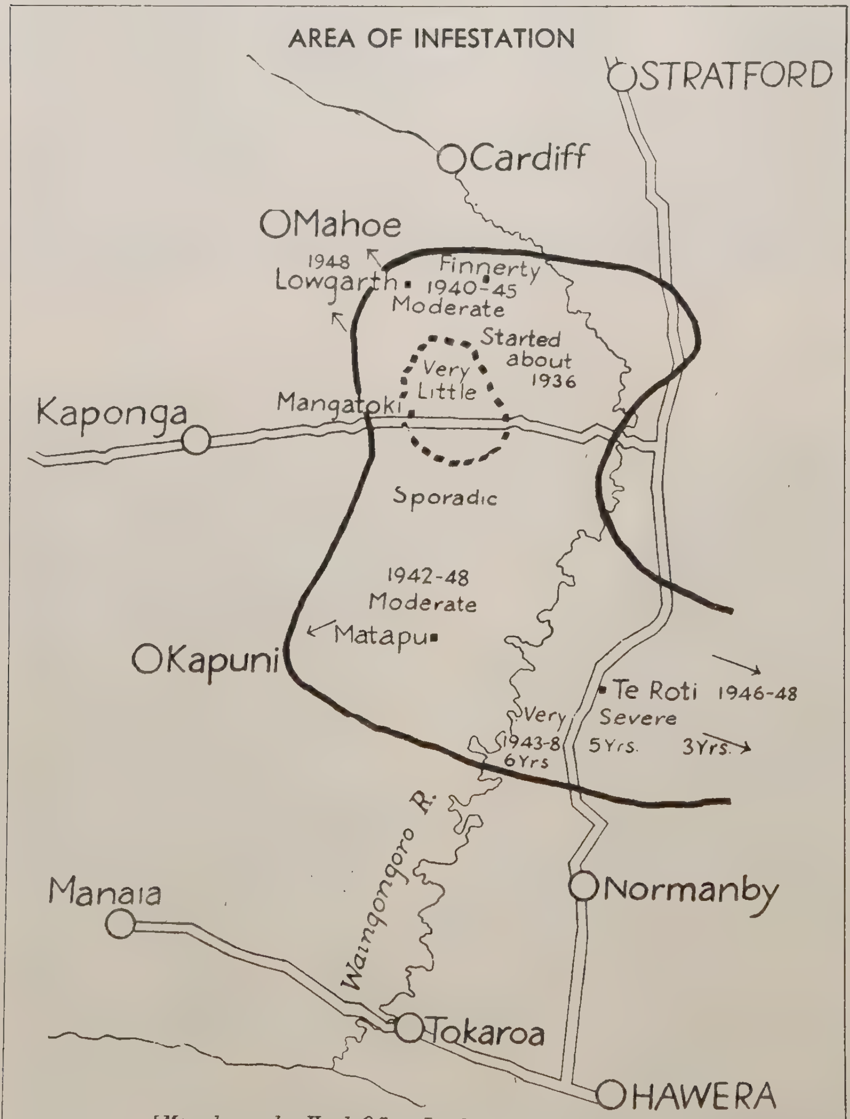
autumn-sown permanent pasture. The temporary pasture may be left for 2 years if the sward is sufficiently strong. Short-rotation ryegrass would last longer than Italian ryegrass and would be more suitable for a pasture to be left down for 2 or 3 years.

Life Cycle of Pest

The main flights of beetles take place at dusk on calm nights, mainly in November, but times of flights vary with locality, season, and weather. Beetles on the wing were noted in south Taranaki on October 27 last year. Flights gradually increased and were strongest on suitable nights between November 15 and 22, despite much broken weather and heavy rains during that period. After that date the flights were small, though weather conditions were excellent. In 1947 the flight season was later and the strongest flight was on November 25, tailing off early in December. Flights frequently are over in about 20 minutes, but more straggling flights may continue for twice as long.

After emergence the great majority of the beetles fly low over the ground until host plants are reached. Though mating has been observed on pastures, it takes place mainly after the beetles have alighted on the host plant, where the female continues feeding while being mated. Host plants often become covered with mated beetles, but before daylight they all return to the ground.

When numerous, beetles are very destructive to cruciferous crops in the seedling stage, and this affects the time at which farmers sow such crops in some areas. Beetles feed on a wide variety of plants, including fruit trees, roses, strawberries, gooseberries, willow, hawthorn, honeysuckle, sycamore, karaka, several species of weeds, boxthorn, barberry, and even trees such as pines, macrocarpa, and lawsoniana. Plum trees are most noticeably stripped of their leaves by the beetle, and the young plums then fail to reach maturity.



[*Map drawn by Head Office, Lands and Survey Department, Wellington.*

Opinions vary about the condition of pasture which the beetles prefer for egg laying, and very little reliable evidence can be submitted. Well-consolidated ground with a dense, vigorous cover and a well-balanced clover content appears to offer more resistance to heavy infestation than open swards on unconsolidated ground. For example, roadsides maintain a good, unbroken cover in a heavily-infested area, though ryegrass may be the main grass species.

According to Dr. D. Miller, of Cawthron Institute, eggs are laid in batches of 10 to 20 mixed in the top inch of soil 8 to 14 days after mating. The eggs swell in contact with soil moisture and hatch after 7 to 16 days. Small grubs, which may be very numerous in the ground from December, gradually increase in size as they feed on the roots just below the surface. Much earth also passes through their bodies, which accounts for the loose, pulverised condition of the soil. As the weather becomes colder most of the surviving grubs cease feeding and hibernate at lower levels. In spring the remaining grubs begin a short feeding stage before changing into pupae. During the non-feeding chrysalis stage metamorphosis into the adult form of beetle takes place. From the pupal stage the beetle emerges, eventually digs up to the surface, and flies under suitable conditions to restart the life cycle. On October 8, 1948, at Fraser Road some grubs but mainly pupae were found in the soil. By October 19 beetles not ready for flight were general, relatively few pupae being found.

Natural Enemies

The grass-grub is preyed on by numerous birds, including starlings, blackbirds, pukeko, poultry, crows, and magpies. Magpies chase small birds away and are unpopular in south Taranaki. Starlings are of greatest benefit and should be fostered. Gulls following the plough and devouring grubs are a common sight on South Island arable lands near the coast. Spiders in hedges prey on the beetles.

The Cawthron Institute is endeavouring to find a parasite which will attack *Odontria zealandica* and at present 6 Australian species are under laboratory tests. One of these has shown some promise of being effective.

Experiments with Insecticides

The "grub-proofing" with lead arsenate of ground being prepared for new lawns, and the use of carbon bisulphide around plants in gardens, have a very limited application. Such methods are impracticable in farm routine for grass-grub control. However, D.D.T. spraying of host plants of the beetle, conducted by the Department of Agriculture in south Taranaki during the past two seasons, offers possibilities as a practical means of reducing the ravages of the pest in certain areas.

It was noted that during the flights of the beetles in November the tops and upper sides of the boxthorn hedges which surround almost every paddock on farms in the areas heavily infested were stripped of foliage by the feeding insects. The concentration of the beetles on these hedges was considered to offer a good opportunity for the use of D.D.T. as a spray in effecting a heavy enough kill of the insects to reduce materially the further infestation of the pastures.

1947 Trial

A heavily-infested farm near Te Roti was selected for the first trials with D.D.T. in 1947. About 800 gallons of spray at the rate of 1.4lb. of wettable D.D.T. (25 per cent.) to 100 gallons of water was applied by power sprayer to boxthorn hedges on November 24 and 25, just before the main flight of the beetles. Orchard trees, garden plants, and hawthorn were hand sprayed.

On sprayed plants beetles became stupefied, dropping without hovering. Many died, but others, though unable to burrow into the ground, were still alive next day. On the lee sides of boxthorn hedges and around fruit trees, where infestation was heaviest, counts of affected beetles ranged from 100 to 500 on horse covers by the next morning. Few kills were found out in the paddocks, as stupefied beetles apparently drop fairly close to hedges. Night spraying on heavily-infested plants resulted in beetles dropping within 10 minutes; all had dropped within an hour.

Birds increased considerably in number in the vicinity of sprayed hedges and the orchard. Neither birds nor poultry which fed on affected beetles were harmed by the insecticide. No dead bees were found anywhere on the area; that is not surprising, as boxthorn, unlike barberry, flowers most in early autumn, not in spring.

1948 Trial

As the spray obviously killed the beetles in large numbers, further spraying was undertaken on a more extensive scale in November, 1948. The main area of heavy infestation had shifted to a block of 1000 acres on the Fraser Road. Here about 15 miles of boxthorn hedges, several plantations, and home orchards were sprayed between November 10 and 18. Because of the terrain and the presence of native bush and plantations, host plants of the beetle could not be covered completely with spray. Trouble with unsuitable hosing and rain falling on 4 days during spraying prolonged operations unduly.

Six thousand gallons of wettable D.D.T. (25 per cent.) was applied at the same rate as in the 1947 trial to both sides of boxthorn hedges and partially to plantations. Speed of application, including filling time at farm water troughs, was about 240 gallons per hour. A sprayer of 300 gallons capacity at a working pressure of 600lb. per square inch was operated from the power take-off of a tractor. A standard orchard spray head of 7 nozzles screwed on to the end of an 8ft. pipe and pivoted for easy manipulation was attached to the back of the machine.

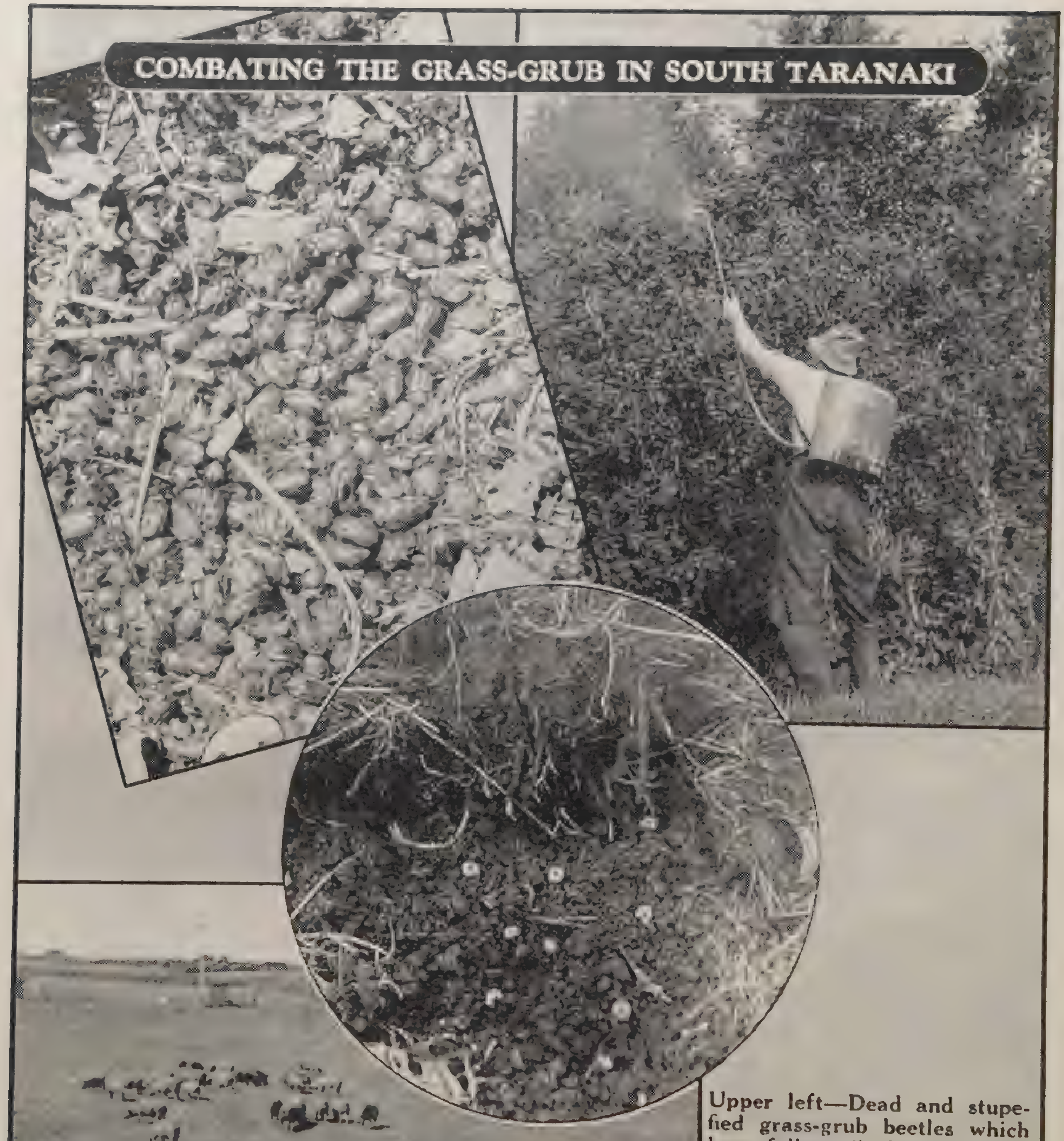
Boxthorn hedges were adequately covered with up and down brush-like strokes by the operator, who could spray from ground level up to about 20ft. if required. Only the tops and part of the sides of hedges require spraying. The tractor was driven at

EXPERIMENTS FOR CONTROL OF GRASS-GRUB

Above—Ninety per cent. damage by grass-grub in pasture on a Taranaki property.

This pasture on the same farm was oversown with ryegrass and white clover after being attacked by grass-grub and had recovered to this extent by the following spring. It had already been grazed once when it was photographed.

COMBATING THE GRASS-GRUB IN SOUTH TARANAKI



Upper left—Dead and stupefied grass-grub beetles which have fallen off plants sprayed with D.D.T. Upper right—With one man spraying and another filling, a mile of hedge was sprayed daily by hand. Middle—Grass-grubs in a south Taranaki pasture. Lower—Large numbers of pigs are carried on grass-grub areas of this south Taranaki farm to help invigorate the ryegrass.

Of the numerous birds which prey on the grass-grub, starlings are of the greatest benefit. To encourage starlings to reside on this Taranaki property nesting houses are provided on top of the farrowing and fattening sties.

about 2 m.p.h. and spraying and filling time was 24 hours; 30 miles were travelled while spraying. With such equipment spraying of boxthorn hedges could be carried out efficiently, expeditiously, and at low cost on flat and rolling country where a good coverage of all hedges could be obtained.

High Proportion of Kills

All beetles feeding on the sprayed host plants appeared to be affected. However, spraying all host plants is impracticable, for beetles are to be found on pine and macrocarpa trees, and even in sheltered areas on weeds and grass blades. Though no reliable estimate of the percentage of beetles destroyed can be made, it appears that a high proportion was killed. Possibly some slightly-affected beetles which fell off hedges were able to lay eggs.

The results obtained in these trials indicate that if spraying in south Taranaki had been done from the start of the severe infestation—which was then in a small, well-defined area on easier country—and the initial attack had been followed up by systematic work each season, an effective measure of control could have been secured.

The pest has now spread to more difficult territory. The country at Fraser Road is more broken and has fewer hedges than the areas infested earlier, and the country over which future infestation may be expected is more difficult still to cover adequately by machine spraying alone.

Future spraying as a farm activity in suitable areas could be done mainly by contract with machinery, assisted by individual hand spraying. However, for a reasonable coverage the co-operation of all farmers concerned would be essential to reduce such a severe infestation as is being experienced in south Taranaki. The farmer on whose property the first year's trial was carried out has sprayed the tops of his hedges with a knapsack sprayer this year, two men covering about a mile a day. This work was undertaken because he was satisfied that the previous work had reduced the infestation of his pastures considerably, particularly where the hedges were treated.

Time of Spraying

In the first trial the main flight of beetles occurred on the evening of the day on which the D.D.T. spray was applied, and that factor was considered to have accounted in no small measure for the rapid action of the insecticide on the beetles. Fine weather followed and the beetles continued to be killed until flights ceased early in December.

Heavy rain fell during the spraying period of the trial at Fraser Road and broken weather continued for a week, rain falling daily, but the D.D.T. remained effective on host plants for longer than a fortnight. The only difference was that the proportion of beetles stupefied rather than killed was higher and a longer period elapsed before all had dropped after each flight. When foliage was sprayed at night all beetles dropped within an hour, the hedges having a deserted appearance in comparison with unsprayed hedges.

Boxthorn grows slowly, but after the second week new growth comes away, though the spray is still apparent on older leaves. With rapidly-growing host plants such unsprayed new growth in a short time must nullify the use of insecticide if it is applied too early. Flights of beetles are made at dusk under fairly-calm conditions and in the absence of rain, and they vary with the season. Within certain limits, the best time for the application of insecticide is largely a matter of judgment. It should be carried out before flights become heavy, and under reasonable growth and weather conditions should prove effective for up to a fortnight.

L. J. Dumbleton, Department of Scientific and Industrial Research, has stated that there are indications that beetles of *Odontria zealandica* attracted to lights and fires are mainly or exclusively males. In any case, little practical help toward a reduction of egg laying can be expected from such means. A suitable insecticide sprayed on the host plants affects the females, and with a reasonable kill this must reduce egg laying and subsequent grass-grub infestation.

Outside Taranaki, where it is used extensively for boundary fences and main subdivisions, boxthorn is little grown, but with the wide range of host plants suitable for spraying, similar work in other districts may also be practicable if the flowering period does not coincide with spraying, when there would be a risk to bees. Hand spraying of farm orchards and gardens and of other host plants could be undertaken by individual farmers at low cost. This would minimise damage to orchards and reduce egg laying if a heavy flight of beetles occurred on their properties.

Insecticide in Topdressing

Small areas of pasture were sprayed on November 24, 1947, but the grubs did not attack the areas selected and no comparisons could be made.

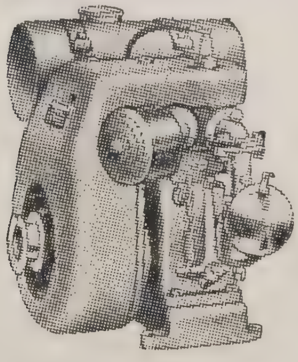
In April and May, 1948, 4 topdressing trials to test the effect of benzene hexachloride on the grub were laid down at Te Roti, Mountain Road, and Fraser Road on heavily-infested pasture. Mixtures to give ½, 1, and 2 per cent. of benzene hexachloride in superphosphate were applied at 100lb. per acre. No effect on the grub or worm population was observed during the season. The insecticide was applied rather late, though grubs were plentiful near the surface at the time of topdressing. In several cases grubs under dung pats received special topdressing, but when next visited all had disappeared into the ground without casualties.

Autumn topdressing of pastures with superphosphate containing insecticides as a means of reducing grass-grub population does not appear promising, but further experimental work is required.

Villiers

THE WORLD'S MOST RELIABLE LIGHT-WEIGHT ENGINES

VILLIERS owners the world over praise the performance of these "little" engines with the big power output. Built in the largest factory in the world making light-weight engines, VILLIERS are unsurpassed for reliability, economy and efficiency.



Obtainable in 1 h.p., 2 h.p. and 2½ h.p. Models.

Factory Representatives:
F. W. CAVE LIMITED
P.O. BOX 1685 - - AUCKLAND
V.E.2

Right from FURROW to HARVEST

The Allis-Chalmers HD5 Diesel is a farmer's major ally in helping to produce extra output for Britain, without extra farm labour. Exceptional pulling power, smoothness of riding, tireless performance and safe grip on all types of soil, cuts operator fatigue, saves time, brings faster returns in crops and other produce. For lighter field operations the sturdy Model "B" is the ideal helper on small farms. For medium acreage, Allis-Chalmers Model "C" Row Crop is a highly dependable and economical aide.

ALLIS-CHALMERS

North Island Distributors:
THE DOMINION MOTORS LTD.
Wellington.
Dealers in all main centres.

TOMOANA PIG PELLETS

the IDEAL food for SOWS!

CONSULT YOUR PRODUCE MERCHANT
J.9

K·P.
SUPER
44/46

KEMPTHORNE PROSSER & Co's
NEW ZEALAND DRUG COMPANY LIMITED
AUCKLAND — WANGANUI — CHRISTCHURCH — DUNEDIN

CARE OF LIVESTOCK DURING JUNE

Contributed by the Animal Research Division.

WINTER FEEDING OF DAIRY COWS

EXPERIMENTS have shown that cows fed well during winter will produce from 26 to 63lb. more butterfat in the following lactation than those poorly fed during winter. These results were obtained when both groups were well fed after calving. It is, therefore, very important to feed cows well from now until calving. If plenty of autumn-saved pasture is available, there is no better winter feed, but the primary purpose of this feed is the good nutrition of early calvers in July, August, and September. It should, therefore, not be used now if that will mean a shortage in those months. If autumn-saved pasture is used, cows should graze it for about an hour a day and in addition should receive 20lb. of silage and 4 to 6lb. of hay. If autumn-saved pasture is not available, cows should be fed as much hay as they will eat, certainly not less than 10lb. in addition to 20lb. of silage. If the winter is a mild one and good grazing is available, silage may be omitted, but ample hay should still be provided.

* * *

RICKETS IN LAMBS

Lambs in Canterbury and some other South Island districts frequently suffer from rickets when wintered on green oats or barley and occasionally this trouble is experienced on other types of greenfeed. It can be prevented by giving one dose of vitamin D at the beginning of the winter. The best preparation is calciferol and the dose is 25 mg. dissolved in the smallest amount of olive oil which can be given conveniently with the drenching apparatus available. Even when rickets does not occur this treatment induces much better growth in lambs during winter. Further details and valuable advice on winter feeding of hoggets in Canterbury will be found in the December, 1946, issue of the "Journal."

* * *

LIVER FLUKE IN SHEEP

In areas where sheep become infested with liver fluke they should be drenched now. The only effective drug is carbon tetrachloride, which should be mixed with 4 times its volume of liquid paraffin. The dose of the mixture is 5 c.c. for sheep of all ages and 1 gallon is enough for about 900 sheep. If only one treatment is to be given, the middle of June is the best time, but if sheep are already showing symptoms, a drench should be given immediately and repeated at the end of July. Further information about liver fluke in sheep and cattle will be found in Bulletin No. 248, which is available free from all offices of the Department of Agriculture.

[*National Publicity Studios photo.*

CARE OF SOWS

Sows and any wintered pigs should be fed on roots plus ½lb. to 1lb. of meat meal per day. Pigs should be kept out of the paddocks when the winter is wet, as pugging of pasture at this time of the year will ruin it for spring and summer feeding. Sows due to farrow should be stied and fed what milk is available. After farrowing they should receive up to 5lb. of meal per day plus milk and roots. Undue economy with meal at this stage will mean light litters at weaning.

* * *

LICE ON POULTRY

Poultry lice can cause considerable loss of condition and reduced egg laying. To control these parasites a fine trickle of 40 per cent. nicotine sulphate should be run along the perches on a calm night before the birds go to roost. Two or three treatments should be given at weekly intervals.

* * *

RINGWORM IN CALVES

Ringworm is sometimes troublesome, especially in poorly-nourished calves. Before applying any remedy the scales should be removed by rubbing in a mixture of equal parts of soft soap and lard and scraping off the softened scabs the next day. The bare patches should then be dressed with an ointment consisting of 1 part of salicylic acid and 8 parts of lard or any registered stock remedy for ringworm which is available. As the infection can be transmitted to man, it is wise to wear rubber gloves when treating ringworm. In any case the hands and arms should be thoroughly washed immediately after the dressings are applied.

MANGOLDS CROP HEAVILY ON HERETAUNGA PLAINS

ON the fertile new soils of Hawke's Bay's Heretaunga Plains probably no more sure and prolific crop is grown than mangolds. If the necessary work is put into the land, a heavy crop is assured. R. P. Hill, Fields Instructor, Department of Agriculture, Hastings, describes methods of preparation and cultivation.

MANGOLDS are grown principally as a cash crop, the roots being sold to hill-country sheep farmers for sheep and cattle feed and to dairy farmers who are unable to grow their own roots. Some sheep farmers on the plains grow their own mangolds in rotation with ryegrass seed, the crop being lifted in May, stored in clamps, and fed out to breeding ewes after the pumpkins are finished. Feed is then assured until the end of August.

On the rich silt soils skim ploughing does not appear necessary. The crop is always grown out of pasture, which is disced heavily in August, deep ploughed in September, given several double cuts with the discs, then fallowed for two or three weeks, after which it is again disced several times, rolled, and the seed drilled in at the rate of 5 to 6lb. an acre in rows from 24 to 28in. apart, depending on the width of the implement to be used for cultivation. About 1cwt. of superphosphate or a mixture of superphosphate with blood and bone is drilled with the seed. Finally the paddock is chain harrowed. As soon as the plants are through and the rows are defined the land is cultivated with a scarifier, and the cultivation is continued until the leaves are meeting in the rows. When the plants are about 4in. high they are thinned to a distance of 12 to 15in.

The amount of work put into the land to grow this crop is probably more than that required for potatoes, but the yields justify the work. An average crop of mangolds grown on the plains in the manner described yields about 85 tons an acre. Last year the heaviest crop weighed in the Hawke's Bay A. and P. Society's competition yielded 140 tons an acre and the next three 120, 115, and 110 tons.

The varieties most grown are Yellow Globe and Tankard, which invariably produce the highest yields.

When the plants are about 4in. high they are thinned to 12 to 15in. apart.

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA, Auckland, at 7.15 p.m. on the following dates:—

June 1—"Current Farming Problems for the Month," by C. R. Taylor, Fields Instructor, Department of Agriculture, Rotorua, and E. R. Marryatt, Fields Instructor, Department of Agriculture, Whakatane.

June 8—"Earth Worms," by R. Nielson, Soil Biologist, Soil Fertility Research Station, Hamilton.

June 15—"A Discussion on the Varieties of Fruit for the Auckland District," by I. L. Nottage and W. S. Kemp, Orchard Instructors, Department of Agriculture, Auckland.

June 22—Young Farmers' Clubs' session, by the Central King Country District Committee.

June 29—"Stock Diseases Controlled by Winter Feeding," by D. M. Corbett, Veterinarian, Department of Agriculture, Whangarei.

The following broadcasts will be made from Station 4YA, Dunedin, after the stock session at 7 p.m. on the dates shown:—

June 1—"Feeding and Management of Stock in Winter," by C. V. Dayus, Livestock Superintendent, Department of Agriculture, Dunedin.

June 15—"Winter Work in the Orchard," by R. E. Binfield, Horticultural Superintendent, Department of Agriculture, Dunedin.

June 29—"The Potato Crop," by W. R. Lobb, Instructor in Agriculture, Department of Agriculture, Dunedin.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in June as follows:—

Auckland—1YA, on June 28, at 12.35 p.m., "Preservation of Skim-milk Curd for Pig Feeding," by H. H. Preston, Supervisor, Northland District Pig Council.

Napier—2YZ, on June 10, at 7.15 p.m., "The Case for the Pedigree Pig," by H. A. Hopkins, Supervisor, Tairawhiti District Pig Council.

Dunedin and Invercargill—4YA and 4YZ, on June 13, at 7.15 p.m., "Sound Feeding Methods," by N. Macdonald, Supervisor, Otago and Southland District Pig Council.

Rabbit Skin Levy Raised

AN increase in the rate of levy on rabbit skins produced and sold in New Zealand was announced recently by the Minister of Agriculture, the Hon. E. L. Cullen. The new levy is 20 per cent., a rise of 10 per cent., and will be effective for the 12 months beginning on June 1, 1949.

The Minister said the increase had been fixed on the recommendation of the Rabbit Destruction Council, and in view of the fact that the levy was payable only at the time of auction or on direct sale to the wholesale trader, buyers were being given due notice of the increase. The rate of levy is based on the full market value of the skins and the new rate would apply up to and including May 31, 1950.

Household Poultry

Principles of Feeding Laying Birds—Modern Trends in Feeding—Lighting of Laying Houses

THE average household poultry unit is run along rather "hit or miss" lines and, especially in the feeding of hens, the majority of householders manage on guesswork, hoping for the best. Scraps of information picked up here and there from friends reputed to be "good with hens" are used, some being excellent but others resembling popular fallacies. The principles and practice of feeding laying birds are discussed in this month's notes for the household poultry keeper by W. L. McIver, Poultry Instructor, Department of Agriculture, Dunedin.

The profitable hen produces 4 times and even more her weight in eggs in a year, each egg being a neatly-packaged, convenient product.

NEXT after housing the biggest change for the better in commercial poultry keeping in the past 30 years has been in feeding, and what is found to be successful by the professional must be good for the amateur. The tendency to take heed of "what Dad did" and "how Grandpa fed his fowls" has probably done more than anything else to hold back modern, scientific improvements in backyard poultry dietetics and general management. Yet the same housewife is not satisfied to follow old-fashioned ideas in the rearing and diet of her children, but takes care to read and study modern authorities and to seek advice from proper quarters. The same common-sense outlook should be adopted toward the household hens.

Though there is no need to try to attain the position of being able to boast that the hens are outlaying those of the neighbours, there is satisfaction in being able to see from the records at the end of a year that the hens have paid all expenses and left some cash in hand. The householder does not need to know a great deal about special diets for hens, but can rely mainly on common-sense application of infant management. In general, the chief principles of housing, rearing, and feeding chicks are identical with those for infants, and for growing pullets they are very much the same as for children. Both require warmth and comfort, food at proper intervals, a variation in diet, vitamins, and food of good quality. It is sufficient for the householder to know only a little about the theory of poultry diet, as prepared, proprietary mashes can be depended on largely.

General Principles of Feeding

Though under natural conditions the hen had to depend for sustenance mainly on leafy materials, insects, worms, berries, and what little grain was available, the modern improved strains cannot be expected to lay the number of eggs they do on such a bare allowance. Attempts to devise satisfactory rations composed of vegetable material alone have been without success, and the results obtained from experiments in which minerals were added to the diet showed the efficiency of certain protein concentrates from a vegetable source and brought about a further enlargement of knowledge of nutrition. It has been ascertained since that vegetable protein comes far from taking the place of protein from an animal source.

A good producing pullet plus 55lb. each of mash and grain makes 170 eggs or more in a year.

In the feeding of pigs, horses, and beef cattle the main concern is to supply food for growth, energy, and maintenance. The dairy cow comes nearest to the conditions applying to poultry. The digestive organs of poultry are comparatively small, no doubt because birds cannot be allowed by Nature to carry extra weight, which would interfere with flight. The fact that birds have no teeth has considerable bearing on feeding methods, because they must have foods that they can manage with the mouth parts given them by Nature. Their digestive systems are not made for coping with hay, straw, or even coarse fibres. Another influence on feeding methods for poultry is that they are fed in flocks and not as individuals.

The main essentials for proper feeding are that the food must be palatable, the food elements must be supplied in proper ratio, the food must not be too bulky, yet must have sufficient bulk, it must be properly administered, and it must be economical in cost.

Palatability obviously is essential in a feed ration. No livestock can be expected to thrive if forced to eat foods they do not relish. Palatability can be used as a means of ensuring a balancing of the ration by combining a less likeable portion with a more desirable one. The two portions can be combined in a ratio that will make the hens consume prescribed amounts.

As the elements of the egg are almost identical with the hen's body elements, it is reasonable to expect that what she expends in egg production should be made up in the same ratio of elements in the food. There must be a balanced ration between carbohydrates and proteins, and allowance must also be made for minerals and vitamins. Full information on this subject, simply stated for the amateur, is given in Department of Agriculture Bulletin No. 198, "The Theory and Practice of Poultry Feeding" (price 6d.).

Bulk is required in poultry feeds to keep the digestive tract normal and healthy. The bulk gives a sense of fullness in the digestive organs and prevents over-eating. The general impression that fowls will eat too much food if it is always left before them in hoppers is incorrect. It is almost impossible for a good producer to over-eat. If a fowl puts on surplus fat, especially on her back, other than when coming through the moult, that can be accepted as an unfavourable sign and she should be culled as a poor producer.

The main objective in keeping hens is to make a profit, so obviously economy in cost of feeds is important. Working toward obtaining a larger egg production is useless if expensive feeds must be used to bring about the increase. The availability of feeding materials is important, and normally it is most economical to feed the grains that are produced near at hand. Central Otago poultry keepers, for example, where ample grain is grown nearby, will find it cheaper to save the expense of freighting mashes for laying hens and use an all-grain diet. Growing pullets must be fed a proportion of mash, but the mature layer can be fed on grains, meat meal, "hard" and "soft" grits, and greenfeed. The grains can be fed hard or soaked; Bulletin 198 gives advice on the feeding of soaked grain.

One of the important factors in feeding for egg production is to put the feed into good stock. The birds should be thought of as egg-producing factories, and economical and efficient work cannot be expected in any factory without ample space, proper machinery, and good conditions.

The hen must have good internal space, and that can be judged from her length of back, width across the hips, and depth of abdomen. She must be housed under proper conditions and fed correctly. The poultry keeper can decide for himself whether to feed dry or wet mash, part mash and part grain or all grain, dry grain or soaked grain, and in troughs or hoppers. The system does not matter as much as the balancing of the ration and the supply of vitamins and greenfeed. Greenfeed is of the utmost importance in maintaining health and keeping birds in good condition for winter production.

The standard laying mashes on the market are good, but it is not sufficient to know that the No. 1 standard mash contains 10 per cent. of meat meal and the No. 2 mash has no meat meal. It is not even enough to think that the No. 1 mash is suitable to feed at all times of the year to both hens and pullets. Nor can it be accepted that the mash correct for hens is proper for pullets during all months of the year. The protein requirements of hens and pullets varies from month to month. In April most hens are in moult and require less protein; pullets hatched early have been in production for 3 months or even longer, thus needing more protein; and late-hatched pullets which have only just begun to lay require little. That is why the poultry keeper should have both No. 1 and No. 2 mashes. Bulletin No. 198 enables an understanding of the theory of balancing the ration and gives a guide to when to feed No. 2 mash, when a combination of 1 and 2, when No. 1, and when more meat meal should be added to No. 1.

Treatment of Poultry Houses after Blood Tests

MANY poultry keepers appear to be still unaware that pullorum infection can be passed from bird to bird through the droppings of infected adult fowls as well as by egg infection. It cannot be emphasised too strongly that the disease does spread among adult birds in that way, and therefore, when reactors are removed from a flock after a blood test, the non-reactors should be removed to a clean house immediately. If that is not practicable, the house which they occupy should be cleaned out and disinfected at once, all droppings removed, and fresh litter put in.

If that is not done, birds which have passed the test are likely to become infected through the droppings left behind by the reactors, thereby destroying the benefit of the blood test. No doubt that is one reason why many flocks tested annually show very little or no reduction in the percentage of reactors.

—A. C. HOWSE, Poultry Veterinary Officer, Department of Agriculture, Wellington.

Whatever line of foodstuff is fed it should be a good sample of its type; low-quality grain should not be fed. Household scraps should be used, but not fats or foods which are too salty. Because the fowls are fed with what is thought to be plenty of table scraps of meat, it cannot be assumed that the birds are necessarily getting sufficient protein.

Feeding Trends

The almost-universal practice of a few years ago of feeding wet mash for the morning meal and grain in the evening is now well on the decrease. In the southern provinces and areas where winters are cold, feeding a warm wet mash has advantages, but elsewhere commercial poultry farmers find that they obtain excellent egg production with less labour by feeding dry mash from hoppers. The householder and the sideliner can very well follow this system. Where all possible household scraps are cooked and mixed in with the wet mash, it is better to continue that method, but if the householder cannot always be punctual in attending to the poultry, or if the worker has irregular shifts and cannot adhere to a routine feeding programme, hopper feeding removes a difficulty which otherwise might deter the householder from keeping poultry at all. Some families like to spend the weekend away from home and find feeding hens regularly a nuisance; hopper feeding should then be adopted.

Various kinds of feeding hoppers are on the market and they can be readily made at home. The important points are that they must allow the feed to pass down without clogging and that the birds must not be able to drag the feed out with beak or claws, causing wastage.

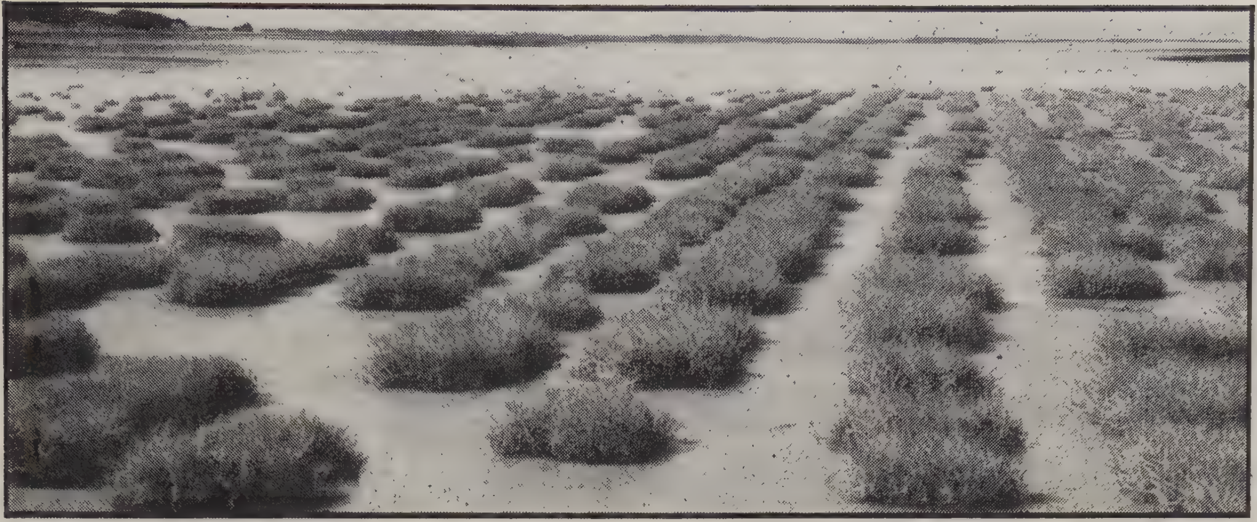
Another modern practice is to place the utmost importance on comfortable, well-built housing. It is also found that proper attention to a good water system, litter, nests, and equipment in general at least saves time if nothing else.

Lighting of Laying Houses

The use of electric lighting at night in the laying house is perhaps the leading modern method adopted for obtaining increased production. The idea of using lights for this purpose is not new—they are reputed to have been used as early as 1895—but knowledge about their use has been increased greatly in recent years. The average householder would not go to the expense of installing lighting in a laying house, but it can be as paying a proposition for the sideline poultry keeper as for the commercial farmer.

The earlier theory was that because the fowls had longer hours for feeding under the lighting system they ate more, and through eating more were able to produce extra eggs. For a long time that seemed correct, because the use of lights does cause the birds both to eat more food and to lay more eggs, but it has now been ascertained that the reverse is correct: The fowls do not lay more because they eat more, but eat more because they lay more. They lay more eggs because the electric light, through its effect on the eyes and the nerve system, stimulates the glandular system and activates the ovary.

As lighting will interest only a few household poultry keepers, further details will not be given, but additional information can be obtained from Poultry Instructors.

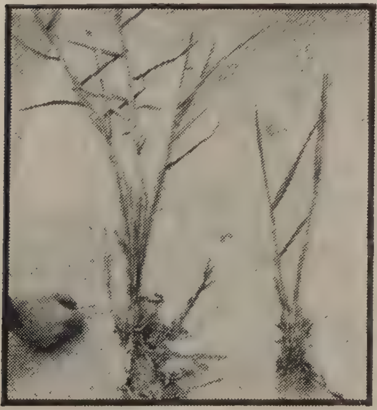


HEADING PHOTOGRAPH: **A bed of *Spartina townsendii* nearly 3 years old on the Waihopai estuary, near Invercargill.**

Spartina townsendii: A Valuable Grass on Tidal Mud Flats

By W. L. HARBORD, Fields Instructor, Department of Agriculture, Invercargill.

FOR thousands of years tidal salt mud flats the world over have made entrances to harbours unsightly and treacherous and have remained as vast areas of waste flats along the coasts of islands and continents. They consist of soft, sticky, saline mud which in many cases appears almost bottomless, and because such areas are often completely devoid of vegetation in the past they have provided an almost unconquerable challenge to man. A little more than 100 years ago about the coasts of England there were large areas of this unsightly, useless, and dangerous mud. Now such mud can be conquered, and by the use of a comparatively-new plant it can be reclaimed to form useful and stable farmlands. This plant which has such an important role is known botanically as *Spartina townsendii* and is sometimes called rice grass or cord grass.



Two plants of *Spartina townsendii*, showing the root system and underground stems. Flower heads are on the extremities of the larger stems. The over-all height is 3ft. 6in.

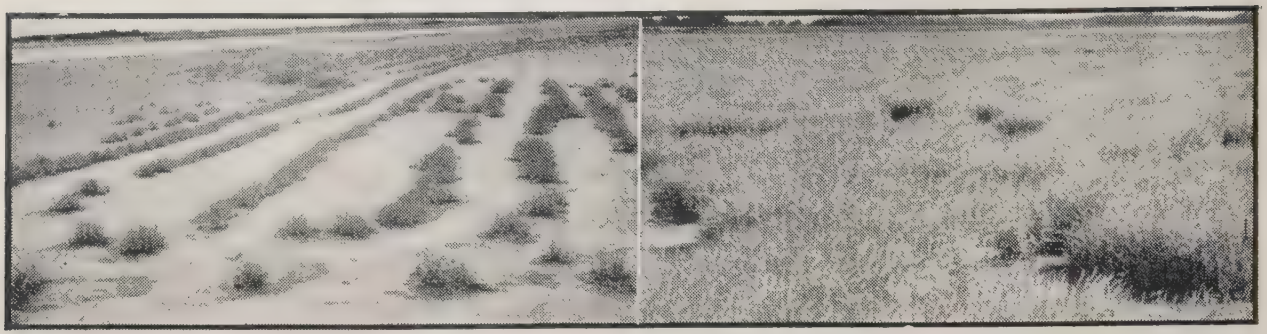
FIRST recorded in England on the Southampton salt marsh areas near Hythe in 1870, by 1880 *Spartina townsendii* was recognised as a new and distinct species of the genus *Spartina* and given the name it now bears. There are a number of species of this genus, but it is thought that *Spartina townsendii* is a hybrid plant whose parents were *S. stricta*, a native plant of the south and east coasts of England, and *S. alterniflora*, a North American species. *S. alterniflora* established in English waters about 1829, having crossed the Atlantic, it is thought, attached to a ship. By 1880 the native species *S. stricta* was quite common and, while the North American species was not very noticeable, the new species *S. townsendii* was recognised, though there was very little of it. By 1920 this new grass had increased and spread to such an extent that many thousands of acres of what had previously been waste mud was gradually reclaimed and converted to areas of flats which at least could be improved until they were fit for a useful purpose. Now *S. townsendii* covers thousands of square miles of salt mud flats on the English coast alone. It has also spread to and is serving a valuable purpose on the coasts of France, Holland, Denmark, and other countries.

Description of Plant

Spartina townsendii is a tall-growing, robust, stiff-stemmed plant growing in some places up to 40in. above the mud. It has a system of aerating cells which allows it to thrive on deep, sticky, salt mud which is low in oxygen. The root system of the plant has two distinct sets of roots—anchoring roots which penetrate quickly and deeply into the mud, and feeding roots which, being comparatively short, grow more or less horizontally beneath the surface of the mud. With such a system the plant is able to establish itself despite being covered by tidal waters.

In the Northern Hemisphere *S. townsendii* spreads both by means of seed, much of which does not germinate, and by means of underground stems or rhizomes. These rhizomes grow beneath the surface of the mud and spread out from the parent plant. Their shoots are able to produce roots, and in this way new plants are established, spreading until an area is covered completely.

When *Spartina* grows on a mud flat the level of the mud is raised by the silt carried in on the incoming tide being dropped among the plants when the speed of the current of the water is reduced. When the tide begins to recede much of this silt is left among the stems of the plants, as the water current over the *Spartina* bed is not sufficiently strong to lift it again



Portions of a 35-acre area of *Spartina townsendii*. The plants on the left are 2 years old and those on the right 6 years.

Introduction to New Zealand

In 1913 Mr. K. Dalrymple, of Bulls, procured some plants of *Spartina townsendii* from Southampton Water, England, and ultimately was successful in establishing them near Foxton, in the estuary of the Manawatu River. The details of this establishment were described by H. W. Allan on page 189 of the "Journal" for March, 1930. From this area many plants have been distributed to various parts of New Zealand. Some have established well, others have been fairly successful, and one, at Invercargill, has been outstandingly successful. In an endeavour to protect the exposed estuary banks from wave wash the Invercargill City Engineer, Mr. F. M. Corkhill, set out 6 plants of *Spartina* in the estuary of the Waihopai River during 1932. Within a few months only 1 plant remained, the others having failed to establish. In November, 1932, a further 1000 plants were obtained from Mr. Dalrymple and planted in several beds about the estuary, and on this occasion establishment proved satisfactory in some of the beds. More plants were set out during September, 1936, and in November, 1938, the planting of an area of about 34 acres was begun. The planting of this area was completed in 1939, and an excellent stand of *Spartina* is now growing there just north and east of the Stead Street Bridge. Since 1939 annual plantings have been undertaken and at present a total of about 70 acres of the mud flats of the estuary is being reclaimed by this grass.

So far no *Spartina* plants are known to have been established from seed in New Zealand. Though the plants flower prolifically each year, there is no evidence that viable seed has ever been set. This is not so in other countries such as England and France.

Level of Mud Raised

Between June, 1941, and May, 1946, measurements of the mud level on one of the *Spartina* beds in the Waihopai estuary were taken by means of sticks embedded in the mud, and an over-all rise in the level of the mud was evident. On 11 out of 12 pegged places the level had been raised up to 9in. with an average of slightly more than 7½in. On the remaining place the level had been lowered by ¾in. because of a runnel or stream carrying a fast flow of water having washed the silt away. Observations by eye indicate that on some of the areas where measurements have not been taken the increase in the deposition of mud has been much greater. The rise and fall of the tide at Invercargill varies between 9ft. and 6ft. for spring and neap tides respectively.

This grass is unique in that, while it will grow on a mud on which very little else will survive, it is very selective in the type of ground on which it will establish. It will not establish on sand and does not thrive unless the mud is covered periodically with salt water. It will grow well on sticky mud containing some sand and over which flows a mixture of river discharge and sea water. Water which flows swiftly appears to retard the plant's growth even if it establishes, and it grows best on an area near a stream channel and over which the flow is comparatively slow.

To establish the plants on the Waihopai estuary they were set into mud by cutting it open with a spade and tramping it about the plants. The plants were set 9ft. apart in rows 9ft. apart. The beds were well covered in from 5 to 6 years.

On the coasts of European continental countries *Spartina townsendii* is used for agricultural purposes. A bed which has been built up sufficiently to keep tidal water out is grazed by such stock as horses to effect initial consolidation. Then the area may be used for hay or silage crops, the *Spartina* supplying the crop material. This stage has not yet been reached in New Zealand.

To what extent *Spartina townsendii* can be used in New Zealand is difficult to estimate because of the varying results secured. At Thames it has been established successfully and is spreading through the mangroves which are growing plentifully in the mud. It was also established at the mouth of the Hutt River a number of years ago, but the plantings were destroyed when the flats were reclaimed for building sites. However, there may still be areas where it would prove valuable in inlets such as are present near Waitati and Paremata, as well as in the North Auckland and Bay of Plenty areas.

***Spartina townsendii* growing among mangroves at Thames.**

Commercial Orchard Spraying Equipment

IN the selection of a spraying outfit the orchardist is often undecided as to the type most suited to his particular orchard. The following article by R. Viney, Orchard Instructor, Department of Agriculture, Hastings, sets out the main advantages and disadvantages of the three standard types in use on commercial orchards today, and may be a guide to growers when making a final selection.

STANDARD spray outfits in use on commercial orchards today are of three types—stationary, portable, and crawler.

Stationary Outfit

The stationary outfit is of fairly simple construction and consists of a shed, conveniently situated in the orchard, housing one or two mixing tanks, a spray pump, and an electric or petrol motor to drive the pump and agitator.

The spray mixture is forced by the pump through pipelines laid systematically throughout the orchard, with stand pipes and taps at various intervals. To these taps the operator attaches a hose and then sprays a block of trees. When all the trees which can be reached conveniently have been sprayed the operator moves on to the next tap, and so on until the whole orchard has been sprayed.

The efficiency of this outfit depends on the following points: The outfit should be conveniently situated in the orchard; it should be powered with an electric motor; and, where two or more persons are spraying simultaneously, there should be two mixing tanks so that spraying is practically continuous.

The **advantages** of a stationary outfit are:—

1. Haulage costs are eliminated.
2. Trees may be sprayed when the soil is too wet to allow mobile outfits to operate.
3. Soil is not packed down.
4. Electric power may be employed.
5. There is less likelihood of trees being damaged.

The **disadvantages** are:—

1. Cost of installation is higher.
2. Pressure is lost owing to friction in the pipes and the distance to the spray nozzle.
3. All pipes require thorough washing out after each spray.
4. Time is wasted in trips to and from the spray shed if blockages or faults occur in the shed.

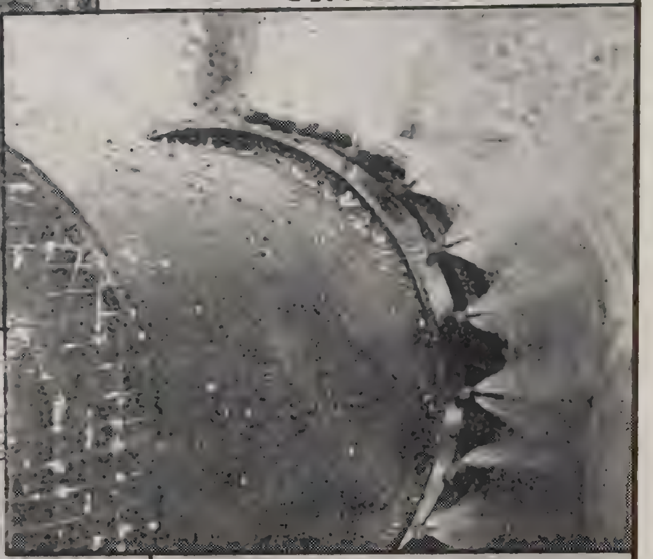
Portable and Crawler Outfits

Portable and crawler types can be grouped, because the only difference between them is that with a portable outfit the operators work on the ground, usually spraying two rows of trees on each side of the outfit—which calls for many stops—whereas with the so-called crawler type the operators ride on the outfit, spraying half of each tree as the outfit moves slowly—but without stops—up and down each row of trees.

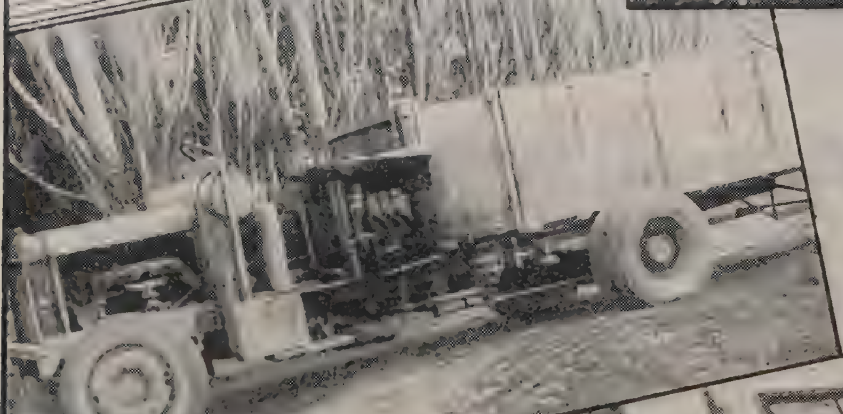
Any spray outfit having the pump and mixing tank mounted on a mobile chassis and which is drawn by a tractor, truck, or horses may be termed a portable outfit. Any portable outfit may be converted to the crawler type, providing the pump is capable of supplying and maintaining

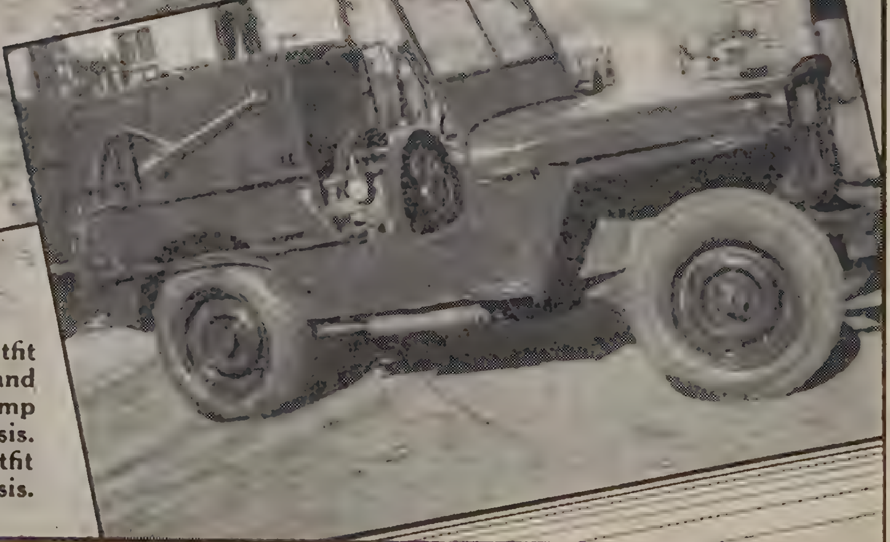
Heading photograph by News-photo Service.

SPRAYING EQUIPMENT USED IN HAWKE'S BAY ORCHARDS



Upper left—Blast sprayer in operation. Upper right—Close-up of the jets on the blast sprayer, which are in 18 sets of 7.





Above — Crawler-type outfit with 800-gallon tank and 35-gallon-per-minute pump mounted on a truck chassis. Right — A portable outfit mounted on a jeep chassis.

[*News-photo Service photos.*

A crawler spray outfit in action. [*News-photo Service photo.*

high pressure and volume delivery and the form of traction used is sufficiently low-geared to maintain a slow, steady pace over the ground while the operators are spraying.

There are many variations in the design and construction of portable and crawler outfits, particularly in the Hawke's Bay district. Some are a complete unit mounted on a truck chassis, with the truck engine supplying power for traction and driving the spray pump, in which case an extra gear box is fitted for power transmission to the spray pump and agitator. Some outfits are drawn by a tractor and have the spray tank, pump, and motor mounted on a truck chassis, and in other tractor-drawn types the spray pump is driven by a power take-off from the tractor.

> **For a crawler outfit to be thoroughly efficient the spray pump must have a good volume delivery and for this reason a pump putting out not less than 20 gallons per minute should be used.**

The efficiency of portable or crawler outfits is dependent upon correct gear reductions, maintenance of high pressure and volume delivery, a reliable petrol engine of sufficient horsepower to drive the pump comfortably at the required pressure, and, with a crawler outfit, an experienced tractor driver.

The **advantages** of these types are:—

1. The outfit is easily and quickly moved from place to place.
2. Individual kinds or varieties are sprayed easily.
3. Any minor faults or blockages may be rectified at once.
4. There are no pipelines to be washed out after each spray.

Special advantages of the crawler outfit are that there is less exertion for the operators (they are riding on the outfit and do not have to drag a hose; trees may be sprayed quicker and more easily—usually 6- to 8-nozzle brooms are used with pressure of from 500 to 600lb. per square in.; and tops of large trees are sprayed more thoroughly, as one operator usually rides on the top of the outfit, while the other works on a platform at the rear.

The **disadvantages** of the portable and crawler outfits are:—

1. Maintenance costs are higher than with a stationary plant.
2. If soil conditions are very wet, it is impossible at times to travel over the orchard and the application of essential sprays may be delayed at a critical period.
3. Petrol engines have to be used and these are more liable to faults than electric motors.

Choice of Outfit

The type of outfit used is dependent upon the orchard itself. On most Hawke's Bay orchards, for instance, the crawler type is satisfactory, as most of the orchards in that district are on comparatively-flat soil and the majority of trees are of an even size throughout a variety. For this type of orchard a crawler outfit can be recommended. This type cannot be recommended, however, for use on any orchard where tree size varies greatly or where the orchard is planted on hill country.

As the success of a crawler outfit depends upon maintaining a steady crawling pace throughout the entire spraying operation and as this cannot be done satisfactorily if tree size varies greatly or if there are variations in the terrain of the orchard, a portable outfit is more suitable for orchards where the ground is uneven or the tree sizes vary.

For orchards which normally experience very wet conditions during the spraying season a stationary outfit would be preferable, as spraying can be done regardless of soil conditions.

Whatever type of spray outfit is used its efficiency depends largely upon the operators and also upon regular and proper maintenance. The following points require to be observed on all types:—

1. All materials and water should be put into the mixing tank through strainers.
2. Filters should be used between the mixing tank and spray nozzle.
3. The motor and pump should be of adequate horsepower and volume delivery to maintain correct pressure at the spray nozzle without overloading the equipment.
4. No time should be lost in refilling after each spray.

Other Spraying Outfits

Last season an orchardist in the Hawke's Bay district imported a blast sprayer from America. It is drawn by a tractor and can be fully operated by the tractor driver, as all the controls are mounted on the tractor. The outfit is 20ft. long from draw-bar to tail, 5ft. 9in. high, and fully loaded weighs 5 tons. (The unladen weight is 2 tons 17cwt.) It is mounted on 11.25 x 24 pneumatic tyres. The tank capacity of this model is 450 gallons and the tank can be filled in 2½ minutes from a reservoir by the outfit's own pump. The 450 gallons of spray are applied to the trees in 8 minutes with all jets open. The sprayer is powered by a 6-cylinder petrol motor which develops 2000 revolutions and 100 horsepower.

The spray mixture is agitated by jets inside the spray tank and there are also jets above the strainer at the filling vent for forcing spray material through the strainer into the tank. A centrifugal pump forces the spray mixture through jets (of which there are 126 mounted in 18 sets of 7) into the air blast, which atomises the mixture and creates a fog which envelops the trees as the outfit moves at a fast speed up and down each row.

The coverage obtained by this sprayer appears to be very satisfactory and the number of trees covered by a tank of spray is equal to, if not more than, that covered by a crawler outfit of the same capacity.

Another portable spray outfit which has aroused much interest was made for the Hawke's Bay Research Orchard by a local firm. The complete unit is mounted on a jeep, the motor of which supplies power for the spray pump and traction. The outfit has a 100-gallon tank and a 5-gallon-per-minute pump which will give 400lb. per sq. in. pressure.

This outfit, which is used for spraying trials on different orchards in the Hawke's Bay district, is particularly adapted for the purpose, as it is a complete, compact unit which may be moved quickly from place to place.

ANDERSONS LIMITED
Manufacturing Engineers
CHRISTCHURCH
Est. 1850

CAPACITY
400 GALLS.
PER HOUR
WITH 60 GALL
PRESSURE
TANK

"REGINA 400"
WATER PRESSURE SYSTEM

PROVED . . .

DRAGON
FLAME
THROWER
DALGETY & CO. Ltd

- EFFICIENT
- EFFECTIVE
- ECONOMICAL

OVER 4,500
SOLD

●

'DRAGON'
FLAMETHROWER
and
High Pressure SPRAYER

Enquire from
DALGETY & CO. LTD. ALL BRANCHES
(Inc. in Eng.)

TOMOANA
PIG PORRIDGE
Emulsified
Food-fats with
VITAMINS

CONSULT YOUR PRODUCE MERCHANT
A11

OUT-CLEANS
OUT-PULLS
OUT-LASTS
Firestone

Proved on
Farm
Tests!

OUT-CLEANS—Firestone Champion Ground Grip outcleans any other Tractor Tyre. Mud and spoil are automatically ejected.

OUT-PULLS—Deep, curved, pyramid-shaped bars take powerful "Centre Bite" in heart of traction zone.

OUT-LASTS—Extra tread depth lengthens tyre life. Bars are buttressed at base and Triple-Braced in centre for greater strength and stability.

Firestone
Ground-Grip CHAMPION
TRACTOR TYRE
The FIRESTONE TIRE and RUBBER CO. of NEW ZEALAND LTD.

PLANTING TREES AND SHRUBS

DESPITE the onset of winter, in most districts the soil is comparatively warm and in a fit state for the planting of shrubs and trees. The selection of subjects, planting technique, and the propagation of shrubs and trees from seeds and cuttings form the principal theme of these monthly notes for the flower gardener by M. J. Barnett, Director of Reserves to the Christchurch City Council.

THE first objective in planting trees and shrubs is to select subjects suitable for the soil and situation where they are to be planted and which may be expected to thrive in the climate of the district. For instance, certain shrubs, such as the rhododendrons, the azaleas which are now classed as rhododendrons, and the heaths generally dislike lime and therefore should be planted in a lime-free soil. Also, though they prefer a reasonably well-drained soil, they will not tolerate hot or dry conditions and should be given positions which are cool and do not become parched during dry weather.

On the other hand, many shrubs will succeed in almost any type of soil and are excellent for dry positions and light soils. Foremost among these are all the species and varieties of *Cistus*, the rosemary, the lavender, all the hybrid brooms (*Cytisus*), the Spanish broom (*Spartium junceum*), the genistas, *Caryopteris mastacanthus*, the rock roses or helianthemums, the yuccas, and many New Zealand shrubs, such as *Senecio compacta* and *Notospartium carmichaeliae*. All of these are good flowering plants, and in poor soils and dry conditions it is much better to rely on them than to attempt the cultivation of more exacting subjects, which unless given special attention will only exist, whereas the others will thrive.

However, such a wealth of material is available that no difficulty will be found in selecting trees and shrubs specially adapted for any soil and situation in the Dominion. A study of nurserymen's catalogues and of gardening publications specially devoted to the cultivation of trees and shrubs will supply much of the information required.

Not only must the subject chosen be one that will thrive under the conditions in which it is planted, but it must remain in keeping with the general surroundings. In its infancy or adolescence, so to speak, a shrub or tree may be all that is desired, but when it reaches maturity it may be much too large for its position or out of proportion with the rest of the garden.

Briefly, the following should be the determining factors when making a choice:

The plants should be sufficiently hardy to succeed in the normal climate of the district.

They should be of such a type that they will thrive in the soil and situation given them.

They should be of such a character that they form part of the general garden composition.

When they have attained adult form they should not be too large or out of keeping with their environment.

Preparation of the Soil

With a selection made, and the supply of the required numbers and kinds arranged, the next step is to prepare the soil in readiness for planting.

Trees and shrubs are the permanent features of the garden, and too much care cannot be lavished on the preparation of the soil in which the plants are to have their being for years to come.

Where possible the ground should be trenched or cultivated to a depth of at least 2ft. If it is not of sufficient fertility, liberal quantities of organic manure should be worked into the soil, but at a sufficient depth to ensure that when trees or shrubs are planted the roots do not come into direct contact with the manure. Poor, sandy, or light soils may be enriched by incorporating with them liberal dressings of leaf mould or decayed compost. These materials are better applied after the initial trenching has been completed, when they may be spread over the surface, dug in, and worked evenly into the soil with a strong garden fork. This operation also serves to break up lumps and reduce the soil to an even texture.

[*Green and Hahn Ltd. photo.*

This *Escallonia montevidensis* growing in poor, sandy soil shows how well this shrub will flourish in relatively-poor soils.

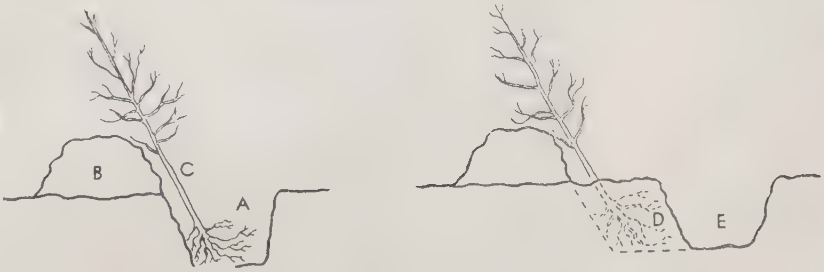
The eradication from the soil of all persistent weeds such as convolvulus, sorrel, twitch and couch grass, and Canadian thistle is imperative before any planting is done. Once such weeds become established among shrubs their eradication is most difficult and in some cases almost impossible.

The setting out of plants immediately after the ground has been trenched is not advisable. It is better to allow the soil to settle to an even consistency, which may take several weeks, after which it should be turned over with a fork as described and reduced to a uniform grade or level in readiness for planting.

Planting Precautions

When the package of plants arrives from the nurseryman it should be opened immediately and the plants carefully removed and separated. If the roots have become dry in transit, they should be steeped in a bucket of water until they are thoroughly moistened and have had time to absorb some moisture; the stems and foliage should be sprayed. If immediate planting is inconvenient, the plants should be heeled in in a sheltered part of the garden. Heeling in consists of opening a trench to a sufficient depth to accommodate the roots comfortably, placing the soil immediately at the back of the trench, laying the plants with their roots in the trench and the stems at an angle of about 45 degrees, and covering the roots with soil, which is formed by pressing it down with the heel of the foot.

HEELING IN PLANTS



A—Trench. B—Soil removed. C—Plant laid in position. D—Roots covered with soil and heeled in. E—Second trench ready for more plants.

The holes or pits to receive the roots should have been prepared in advance. In the case of a border of shrubs the exact spot that each specimen will occupy should have been marked with a peg, consideration being given to the growth dimensions of each and their relative positions as individual specimens and as units in the general composition and effect aimed at. Each hole should be sufficiently deep and wide to take the whole of the root system without having to force the roots into it. It should be 1ft. greater in diameter than the width of the roots when spread out to their fullest extent, allowing a space of 6in. all round between the outer tips of the roots and the sides of the hole.

The planting of trees and shrubs even a few feet high is a 2-man job. One holds the specimen upright and in the correct position in the hole, while the other, after having spread out the roots in all directions, carefully fills in the soil, which should not be dry and lumpy nor yet wet and sticky.

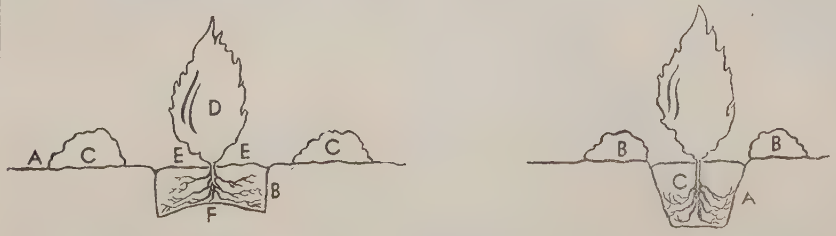
A too-common practice when planting is to fill in all the soil in one operation after the roots have been placed in position. Though sufficient for compact, fibrous-rooting subjects like rhododendrons, that method will not suffice for other plants, particularly many of the trees, on which the lateral or secondary roots radiate at varying heights from the central axis or main taproot. Therefore, to ensure successful planting the method is first to cover the lower layer of roots, firm the soil, then spread out the roots immediately above, cover these, and so on until all the roots have been adequately covered with soil. The soil must be worked evenly among the roots throughout; the person holding the specimen can assist with this work.

Should the soil be on the dry side at the time of planting, each plant should be given a good watering. If there is any fear that wind will loosen upright plants, each one should be supported with a stake fastened securely to the main stem but in such a manner as not to injure it.

[*Green and Hahn Ltd. photo.*

Tree roots in position in a suitable hole prepared for them. The rod shows the mark on the stem which indicates the previous soil level.

THE RIGHT AND WRONG METHODS OF PLANTING



Correct method (left): A—General level of soil. B—Hole wide and deep enough for tree roots. C—Soil from hole placed clear to facilitate planting. D—Plant with roots spread out in all directions. E—Level of soil after planting. F—Bottom of hole raised in the centre to assist in spreading roots. Incorrect method (right): A—Hole too deep and not wide enough to take the roots without crushing them; wall inclining outward from a narrow base. B—Soil too near the edge. C—Roots too far below the surface.

Points to observe when planting trees and shrubs are:

Remove with a sharp knife all broken and badly-damaged branches and roots, but retain as much of the rooting system as possible, and especially all fibrous roots.

Never allow the roots to become dry; those on plants that are not to be set out immediately should be kept covered with moist soil or a wet sack.

Plants to be taken from pots should have the crocks removed, the topsoil carefully scraped away, and the outer roots freed from the ball of earth.

When heeling in or planting be careful that the boot does not scrape or otherwise injure the bark of the stem or roots.

Do not plant too shallowly, so that when the soil settles the surface roots are exposed, or too deeply; usually a soil mark on the stem shows the depth at which it was planted in the nursery, and 1 or 2in. below this is sufficient.

Above all, treat each plant as a vital, living organism and not as a mere inanimate object.

Propagation from Seed

Seeds of such trees as the oaks, the beech, the pink and white horse chestnuts, and the sweet chestnut may be sown now. These seeds, though comparatively large, do not hold their power of germination for long and should be sown shortly after they have fallen from the trees. They may be sown directly into prepared seed-beds in a sheltered part of the garden or, if that is inconvenient at the time, they should be stored in damp sand or leaf mould until late winter or early spring, when they will just be starting to show signs of germinating. The seeds must not be stored dry as is the practice with most kinds. If only a few plants are required, a limited number of seeds may be sown in pots or in seed trays and allowed to grow there until they are sufficiently large to be transplanted to the open ground.

Seed of most berried plants, such as the holly, the hawthorn and other species of thorn (*Crataegus*), and the cotoneasters may also be sown. In such cases the seeds are stratified—that is, they are placed in layers in a container of damp sand, kept in a cool place for at least 4 months, and then sown, sand and seeds, in drills in a prepared seed-bed. Some, such as the holly, may be left in the stratified state for 12 months.

Hard-coated seeds of such plants as kowhai and wattle germinate more readily if the horny outer seed coat is softened. Boiling water poured over them has proved effective in hastening germination.

Seeds of roses, rose species, and the *Pyrus* or crab apples germinate more readily if they are submitted to a few degrees of frost. The usual method adopted is to sow them in pots after the seeds have been cleaned by rubbing them through sharp sand and then plunge the pots in sawdust or coke breeze outside where they will be exposed to the winter weather.

Propagation from Cuttings

Many shrubs and some trees may now be propagated successfully from hard-wood cuttings. The following list gives some indication of the plants that can be raised in this manner: Privet, flowering currant, forsythia, philadelphus, spiraeas, senecios, olearias, broad-leaved laurel, *Prunus pissardi* and its varieties, *Prunus pollardi*, *Platanus orientalis*, tamarisk, veronicas, poplars, and willows.

For the cuttings, firm, well-ripened growths of the previous season should be selected; weak, spindly, and soft unripened wood should not be used. The cuttings are cut into lengths of about 12in. and are made by cutting the base square across the stem with a sharp knife about ½in. below a joint or node and removing the top or unwanted portion immediately above a joint. Some cuttings take root better with a heel to them; a heel is a small portion or slice of the old wood attached to the base of the younger wood.

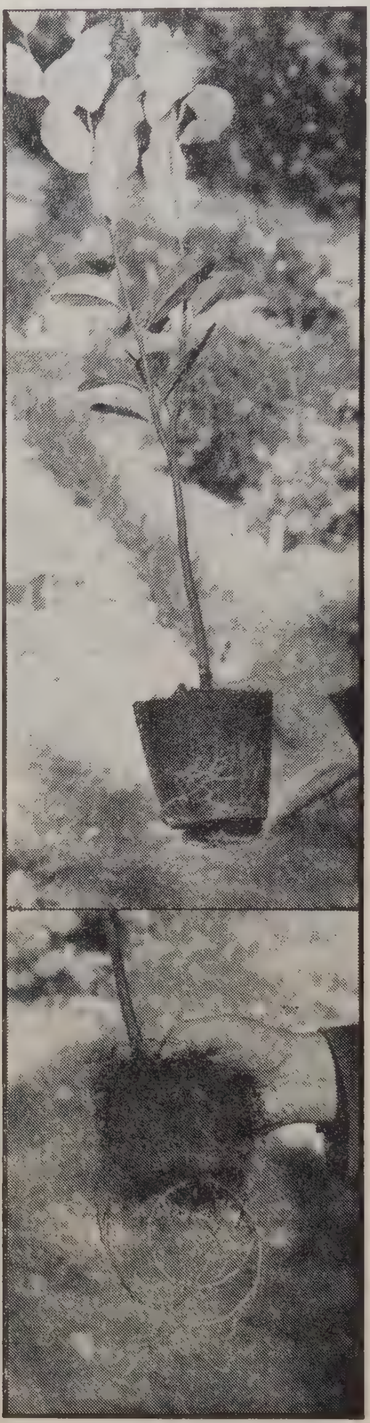
When the cuttings have been prepared they should be inserted in neatly-prepared trenches in the open ground, preferably in a well-sheltered position where the soil is always moderately moist. The cuttings should be buried to half or two-thirds of their length, and to provide a more suitable rooting medium a layer of sand should be placed at the bottom of the trench. The soil should be well heeled or made firm so that the cuttings do not become loosened by wind or frost. Once planted, the cuttings should not be disturbed for 12 months, by which time they will have rooted and be ready for transplanting.

Plants to be Pruned

The pruning of rambler roses, as advised last month, may be continued.

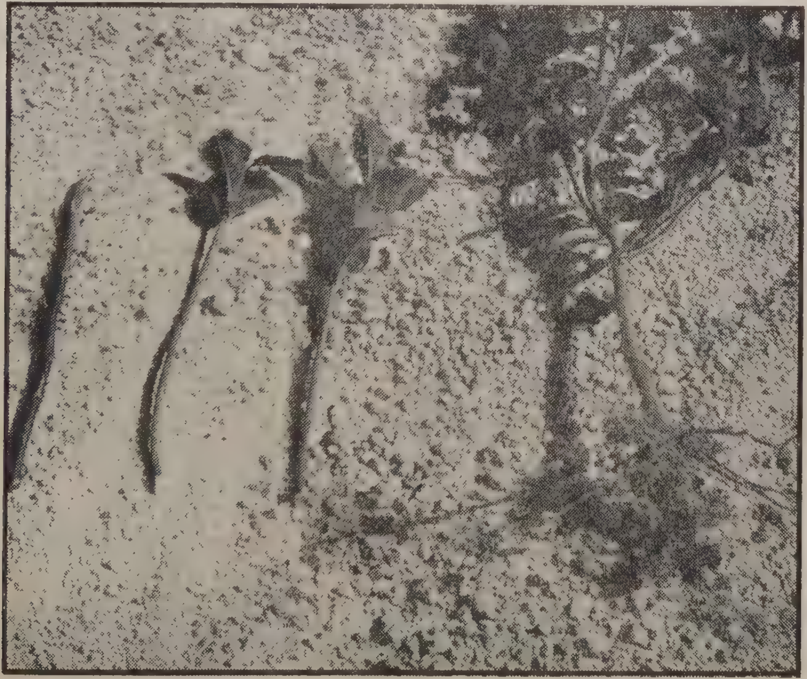
Such shrubs as the golden-leaved elderberry, the tamarisks, and *Buddleia variabilis* and its variety Ile de France may be pruned now. As all of these are robust growers and produce both better foliage and better flower heads from the young growths that will develop later, they should be pruned hard back to within a few inches of the old wood.

Spring-flowering and early summer-flowering shrubs, such as the forsythia and the flowering currant, should not be pruned until after flowering.



[*Green and Hahn Ltd. photos.*

A young tree to be transplanted as it appears when removed from a pot and, below, the roots prepared for transplanting. The topsoil has been scraped away and the roots carefully eased away from the main ball of earth.



[*Green and Hahn Ltd. photo.*

Left—A cutting of flowering currant without a heel. Middle—Two cuttings of privet with heels at their bases. Right—A young plant of *Prunus pissardi* about 9 months after the cutting was taken.

[*Green and Hahn Ltd. photo.*

Belladonna lily, one of the most popular of autumn-flowering bulbous plants, planted on a well-drained, sunny slope at the base of a rock wall.

Plants Recommended by the District Council of the Royal New Zealand Institute of Horticulture for Planting in the Waikato

Native Trees

Houhere (*Hoheria populnea*)
Kawaka (*Libocedrus plumosa*)
Kowhai (*Sophora* (*Edwardsia*) *tetraptera*)
Purple ake-ake (*Dodonaea viscosa purpurea*)
Red beech (*Nothofagus fusca*)
Tanekaha (*Phyllocladus trichomanoides*)

Exotic Shrubs

Andromeda (*Pieris*) *japonica*
Azalea indicum Splendens
Camellia sasanqua
Chimonanthus fragrans (allspice)
Daphne odora
Erica melanthera
Feijoa sellowiana (bears edible fruit)
Kalmia latifolia
Kolkwitzia amabilis
Leucospermum reflexum
Lilac (*Syringa vulgaris* and vars. buffoon, Marechal Lannes, and Souvenir de Louis Spath)
Magnolia soulangeana
Rhododendron, various
Rose species (*Rosa moyesii, R. pomifera,* and *R. rugosa*)
Smoke bush (*Rhus cotina atropurpurea*)
Viburnum opulus and *V. carlesii*
Waratah (*Telopea speciosissima*)

Deciduous Exotic Trees

Beech (*Fagus sylvatica,* ordinary and purple-leaved forms)
Birch (*Betula papyrifera* and *B. alba*)
Horse chestnut (*Aesculus carnea,* the red horse chestnut)
Idesia polycarpa (preferably both sexes)
Japanese cherry (*Prunus serrulata,* var. J. H. Veitch
Laburnum vulgare
Liquidambar styraciflua
Maidenhair tree (*Ginkgo biloba*)
Pin oak (*Quercus palustris*)
Prunus mume and *P. cerasifera moseri fl. pl.*
Tulip tree (*Liriodendron tulipifera*)

Native Shrubs

Kumarahou (*Pomaderris elliptica*)
Mairehau (*Phlebalium nudum*)
Pink manuka (*Leptospermum scoparium* var. *martini* and var. *keatleyi*)

Evergreen Exotic Trees

Acacia baileyana and *A. leprosa*
Magnolia grandiflora

Climbers

Abutilon megapotamicum (syn. *A. vexillarium*)
Akebia quinata
Celastrus scandens (both sexes needed)
Jasminum primulinum
Kennedya comptoniana
Lathyrus tomentosus (Argentine pea)
Mandevilla suaveolens
Oxypetalum caeruleum
Rose, various
Vitis inconstans lowi
Wistaria, various

Herbaceous Plants

Aster (*Michaelmas daisy,* especially *A. frikarti*)
Astilbe (*Spiraea*), various
Dahlia, various
Delphinium, various
Gerbera jamesoni (needs drainage and a sunny aspect)
Gypsophila paniculata (Bristol Fairy)
Helianthus quertifolius (Autumn Glory)
Iris, bearded
Lupins, various
Pentstemon, various
Phlox, various
Polyanthus, various
Kniphofia, various
Rudbeckia, especially var. Herbstone

Bulbs and Bulbous Plants

Anemone, various
Freesia (hybrids and *F. burtonii*)
Gladiolus, various
Iris (Spanish, English, Dutch, and *I. reticulata*)
Lilium auratum, L. croceum, L. henryi, L. longiflorum, L. marhan, L. formosum, L. regale, L. testaceum, and *L. tigrinum*
Narcissus (especially N. Soleil d'or)
Nerine (*N. bowdenii, N. fothergillii* major, and *N. sarniensis*)

Plants for the Rock Garden

Aubrietia, various
Freesia, various
Helianthemum (rock rose), various
Primula (Wanda and *P. malacoides*)
New Zealand rock lily (*Arthropodium cirrhatum*)
Lithospermum prostratum
Iris, various dwarf species
Veronica, various

In districts where severe frosts are experienced the pruning of evergreen shrubs should be delayed until later.

Now is a good time to attend to the pruning and removal of unwanted branches of all deciduous trees.

Overhaul of Rock Garden

A general overhaul of the rock garden, if it has not been attended to already, should be proceeded with at once. All strong and rampant-growing subjects which tend to grow beyond their allotted space and to crowd out smaller but more treasured plants should be restricted to their proper confines. Replanting may require attention, and, if required, the pockets and interstices should be topdressed with a good compost of friable loam, leaf mould, and sharp sand. Close-growing alpines that tend to suffer from rot because of their foliage coming into close contact with the cold, moist soil should be protected by a thin layer of coarse sand or ¼in. quarry grit placed between the basal leaves and the soil.

A sharp look-out should be kept for slugs, which find the rock garden a safe and convenient harbourage for the winter months.

Care of Plants under Glass

Schizanthus which has been growing under glass for early flowering will require potting on and staking. To induce a bushy habit the tips of the leading shoots should be pinched out.

If they are forward enough, calceolarias should be potted on into 6in. pots, in which they will flower later.

Pots or bowls of hyacinths, tulips, narcissi, lachenalias, and freesias should be placed under glass for forcing into early bloom as required.

Winter-flowering Plants

Two good, perfectly-hardy, winter-flowering herbaceous perennials are *Helleborus niger* (the winter rose) and *Iris stylosa*. Both are of such easy culture that too frequently little attention is given to them.

[*Green and Hahn Ltd. photo.*

Hard-wood cuttings inserted in a trench in the open ground.

Though it will succeed in a variety of situations, the hellebore gives of its best when planted in a soil that is rich in organic matter and cool and moist at all seasons. Dryness at the root it does not like, especially during its growing season, which begins immediately after the flowering period and continues until early autumn. Open but sheltered spaces between bushes of rhododendrons or underneath the protecting canopy of foliage of such shrubs as the Japanese maples suits them admirably. A light mulching of fallen leaves in autumn not only protects the flowers from mud stains splashed up by raindrops but also causes an elongation of the flower stem, a valuable asset when cut flowers are required. The fresh young foliage develops with the advent of spring, and from then onward the plants should not be neglected. Copious waterings should be given during periods of dry weather, and as an aid to conserving moisture in the soil as well as to supply material for surface feeding a good mulching with compost or half-decayed farmyard manure should be spread among the plants during November.

Unlike the hellebore, *Iris stylosa* prefers a warm situation and a well-drained soil. Some gardeners believe that it will succeed in the poorest of soils and for this reason it is too frequently given but casual attention. Though it would exist where many another plant would fail, it will respond to good treatment. When the plants are starved the flowers are fewer, of shorter stalks, of paler colour, and lacking in substance. It is an evergreen, producing fresh foliage each season, but the old foliage will persist for years, gradually dying and remaining mixed through the greener leaves, giving the plant an untidy and bedraggled appearance. To prevent such a state the old foliage may be cut over entirely a few inches above ground in spring as soon as the flowers are over. The young growth will follow immediately and remain fresh and green until the following year, when the process may be repeated. Experience over many years has proved that this practice injures neither the vigour of the plant nor its propensity for flowering. The delicately-textured flowers are so easily bruised and injured that when they are required for cut blooms they should be cut just before the petals unfold, and placed in water; within a few hours they will open out to their full beauty.

Autumn-flowering Plants

Escallonia montevidensis is a late-flowering evergreen shrub or small tree which is perfectly hardy and will succeed even in relatively-poor soils. The specimen illustrated at the head of this article is growing in a poor, sandy soil.

Amaryllis belladonna (the belladonna lily) is one of the most popular of autumn-flowering bulbous plants. It thrives best in a position fully exposed to the sun and in a soil that is perfectly drained and contains a considerable amount of gritty substance, such as rock fragments or coarse sharp sand. The bulbs should be planted just below the surface of the soil. Once established, they should remain undisturbed for years.

Plants Recommended by the District Council of the Royal New Zealand Institute of Horticulture for Planting in South Canterbury

Native Trees

Pittosporum eugenioides
Sophora tetraptera
Dodonaea viscosa atropurpurea
Hoheria lyallii
Metrosideros lucida

Evergreen Exotic Trees

Magnolia grandiflora
Cedrus deodara
Cryptomeria japonica and *C. elegans*
Arbutus unedo
Acacia baileyana

Deciduous Exotic Trees

Quercus palustris
Prunus pissardi nigra
Pyrus (Malus) atropurpurea
Prunus serrulata J. H. Veitch
Betula papyrifera

Native Shrubs

Leptospermum scoparium keatleyi
Clianthus puniceus
Notospartium carmichaeliae
Senecio greyi

Exotic Shrubs

Pieris japonica
Camellia sasanqua Hiryu
Chimonanthus fragrans
Hydrangea Heinrich Seidal
Rhododendron fragrantissimum
Azalea mollis Koster's Brilliant
Cotoneaster Conspicua
Erica melanthera
Magnolia stellata
Spartium junceum

Herbaceous Plants

Aster King George
Erigeron Elsie
Lychnis viscaria fl. pl.
Salvia patens
Carnation Otaki pink
Meconopsis baileyi
Campanula Telham Beauty
Gypsophila Bristol Fairy
Scabiosa caucasica Blue Mountain
Helenium Moorhein Beauty

Bulbous Plants

Lilium regale
Narcissus Soleil d'or
Gladiolus Picardy
Nerine bowdeni
Iris Wedgwood

Annuals or Biennials

Lavatera Loveliness
Stock Beauty of Nice
Nemesia strumosa Suttoni
Marigold Harmony
Phlox drummondi

Plants for the Rock Garden

Lithospermum Grace Ward
Cyclamen neapolitanum
Gentiana sino-ornata
Pulmonaria angustifolia
Erica carnea Praecox Rubra

[*Reprinted from the "New Zealand Gardener," official organ of the Royal New Zealand Institute of Horticulture.*

GROW PEAS on Contract

Plan now for next season's area and be certain of obtaining the highest prices with no risk of markets. Some peas may be difficult to sell but by contracting with Yates you can be certain of price and disposal. Grow Peas that suit your land—our experts will advise the right variety. Sow seed produced by a New Zealand Seed Firm for New Zealand conditions—maximum yields. Highest prices and an assured market; no gamble—prompt payout.

ALL GARDEN TYPES AVAILABLE

ARTHUR YATES

& Co. Ltd.

AUCKLAND and CHRISTCHURCH

See your nearest representative early—

AUCKLAND: Head Office. Box 1109.

GISBORNE: Common Shelton & Co., Ltd.

HASTINGS: Turners (H.B.) Ltd.

BLENHEIM: A. Yates & Co. Ltd., Branch Office.

CHRISTCHURCH: A. Yates & Co., Ltd., Manchester Street.

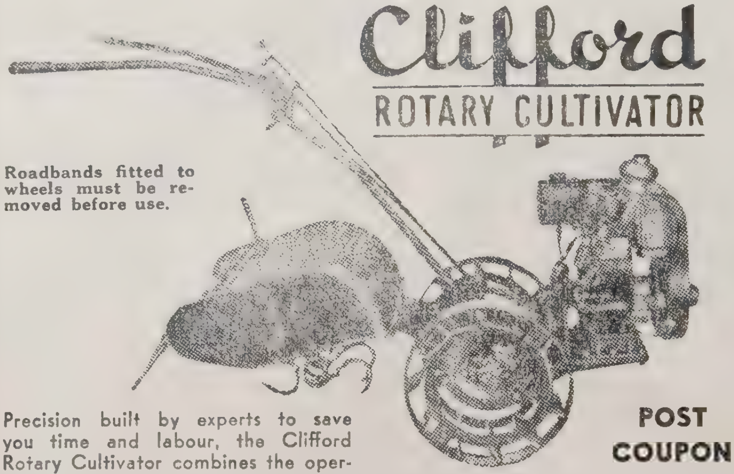
OTAGO: Chas. E. Wallington, Omakau (phone 6K); alternative address: 19 Granville Terrace, Belle Knows, Dunedin. Phone 21-746.

SOUTHLAND & WAKATIPU: D. W. Thompson, Queenstown. Box 91. Tel. 42M.

It's a Great Money-maker!

USE BRITAIN'S

Clifford
ROTARY CULTIVATOR



Roadbands fitted to wheels must be removed before use.

Precision built by experts to save you time and labour, the Clifford Rotary Cultivator combines the operations of digging, ploughing, forking, discing, breaking and cultivating. "Clifford," the modern all-purpose cultivator, means more vegetables from the same land and more fruit from the same orchards at a reduced labour cost, and that must mean a big increase in profits!

DISTRIBUTORS IN ALL MAIN CENTRES.

POST COUPON

To AGRICULTURAL CULTIVATORS
(N.Z.) LTD.,
P.O. Box 1102, AUCKLAND.

Please forward me full particulars of the Clifford Cultivator.

NAME ....

ADDRESS ....

.... J.A.

FRIENDLY UNDERSTANDING of your problem

The Managers and other officers of the Bank of New Zealand in 260 Branches and Agencies will be pleased to help and advise you in all financial matters.

BANK OF NEW ZEALAND

SERVING OUR DOMINION SINCE 1861

2.8A

New Zealand Young Farmer Second in Leadership Contest at Sydney Royal Show

A NEW ZEALAND young farmer was selected to compete in a leadership contest to be decided in a half-hour broadcast from the Australian Broadcasting Commission's Sydney Showground studio during the Sydney Royal Easter Show. The successful young New Zealander who made the trip was Gilbert Evans, of the Carterton Young Farmers' Club, in the Wairarapa district. The final was broadcast on Thursday, April 14, and Evans upheld the confidence placed in him by the judges of the Dominion final by winning second award in competition with State champions from all over Australia.

The winner of the New Zealand contest, Gilbert Evans, being interviewed by the questionmaster, the Hon. F. Waite. Seated are the Minister of Agriculture, Mr. Cullen, and the judges, Dr. W. M. Hamilton and Mr. R. B. Tennent.

THE competition, inaugurated 2 years ago and sponsored by the Australian Broadcasting Commission, was open to members of junior farmers' clubs or their equivalent (such as young farmers' clubs and junior branches of the Agricultural Bureau) in the 6 States of the Commonwealth—New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. In both 1947 and 1948, elimination tests, followed by broadcast competitions, were held to select the champion in each State and the 6 finalists were brought together to compete in a half-hour broadcast to determine the junior farmer champion leader.

The Dominion president congratulates the winner of the Dominion final. From left: I. E. Vercoe, Otago-Southland; D. F. Power, Canterbury; A. Smith, Auckland; G. Evans, Wellington; and D. G. McLachlan, Dominion president.

Earlier Contests

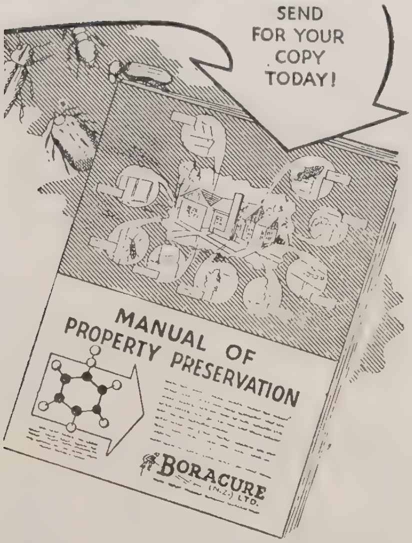
The final in 1947 was broadcast from the showground during the Royal Easter Show at Sydney. The 6 State champions were entertained as guests of the A.B.C. for 10 days. The contest was compered by Mr. Bernard Carter, one of Australia's foremost rural commentators, and the judges were Mr. John Green, Director of Rural Broadcasts for the B.B.C., and Mr. Wallace Kadderly, an agricultural expert from Portland, Oregon, U.S.A., both of whom were visiting Australia at that time. Because of the varying age limits of the organisations in different States, the contest was arbitrarily confined to members between the ages of 16 and 21 years. The contestants were judged in an ad lib. broadcast, during which the compere put leading questions designed to test their farming knowledge and give opportunity for revealing leadership qualities and personality. The contest was won on that occasion by 20-year-old Austin Ninnes, of South Australia. The prize was a month's tour of New Zealand, sponsored by the A.B.C.

Ninnes arrived in Auckland by air on April 10 and was met by the New Zealand Y.F.C. organising secretary, who interviewed him over Station 1YA Auckland the following evening. His itinerary, originally planned for 1

know your borers!

What is an Ambeodontus Tristis? What is the life cycle of termites? How do you distinguish between attacks by various wood boring insects? How should a property be treated? What is the Boracure background? You'll find the answers in the Boracure "Manual of Property Preservation."

FREE 16-PAGE MANUAL


SEND FOR YOUR COPY TODAY!
MANUAL OF PROPERTY PRESERVATION
BORACURE (N.Z.) LTD.

Size 11" x 8½". Profusely illustrated. Printed in colour. Full of interesting, authenic details of the wood destroying organisms menacing properties in New Zealand. A better understanding of borer will help in its control and to this end Boracure offer this elaborate staff-training Manual to the general public. Nothing like it ever before in New Zealand. Send for your free copy.

BORACURE (N.Z.) LTD.

217 LAMBTON QUAY, WELLINGTON.
Telephone 40-050.
Branches Throughout the Country

Boracure (N.Z.) Ltd.,
P.O. Box 632, Wellington.

Please send me a free copy of the Boracure "Manual of Property Preservation."

NAME ....

ADDRESS ....

....

Your best buy in Blankets

Onehunga

WOOLLENS WITH A PEDIGREE

Distributors throughout N.Z. SEAL OF QUALITY STANDARD SARGOODS *Sargood, Son & Ewen Ltd.*

Don't be an "In-betweener"

Keep to three good meals a day

Frequent snacks mean tooth decay.

ISSUED BY THE DEPARTMENT OF HEALTH 17.48

month, covered many important farming centres in the Dominion. He visited a number of Y.F.C. units in various districts, and broadcast 3 times, including the Auckland interview, in each case on a national link. The Y.F.C. Federation sponsored a further 10 days' tour so that areas in Otago and Southland could be visited. Ninnes made many friends while in the Dominion, and will be remembered for his size alone; he was then 6ft. 4in. tall and weighed nearly 14 stone. His main interests were fat lamb raising and soil-erosion problems.

The 1948 contest was run on similar lines and the final was broadcast from the studio at the Melbourne Royal Agricultural Century Show. The broadcast was again compered by Mr. Carter, the judges on this occasion being Professor S. M. Wadham, president of the Chamber of Agriculture, and Mr. A. F. Caddy, a council member of the Chamber of Agriculture and a prominent grazier and stud breeder. The prize in this contest was a sponsored tour of any State in the Commonwealth selected by the winner. Athol Barratt, of Western Australia, who gained the award, chose to tour Tasmania.

New Zealand Invited to Participate

This year the A.B.C. invited the New Zealand Federation of Young Farmers' Clubs to send a member to take part in the competition, to be known as the Australasian Junior Farmer Leadership Contest and to be broadcast during the Sydney Royal Easter Show. The federation accepted the invitation, which included 10 days' hospitality and entertainment in Sydney during the show period. The conditions were the same as in the previous competitions —the contestants to be bona fide members of young farmers' clubs, between 16 and 21 years of age, and engaged in farming.

The first step toward selecting the New Zealand representative was to circularise clubs giving each the opportunity to nominate 1 competitor in a district elimination contest. Considerable interest was aroused in most districts, but it is possible that, because of the New Zealand Y.F.C. age limit of 30 years, some of the clubs regarded the competition's limit of 21 years as too much of a handicap and took no action. The elimination tests resulted in 30 entries being received from the 38 Y.F.C. districts in the four council areas; Otago-Southland, with 6 districts had 5 entries; Canterbury (8 districts), 6 entries; Wellington (11 districts), 7 entries; and Auckland (13 districts), 12 entries.

To determine the council finalists, broadcasts were held in the council centres:—

March 2: 4YA Dunedin (linked with 4YZ Invercargill). Questionmaster, Mr. S. R. Whyte; judges, Professor F. Soper, Messrs. A. C. Drake and A. Stuart.

March 8: 3YA Christchurch (linked with 2XN Nelson). Questionmaster, Mr. R. Bevin; judges, Messrs. L. W. McCaskill, M. Fleming, and C. C. Leitch.

March 9: 1YA Auckland. Questionmaster, Mr. A. J. Kerse; judges, Messrs. H. Woodyear-Smith and G. R. Bentley.

March 11: 2ZA Palmerston North (linked with 2YA Wellington, 2XP New Plymouth, 2XG Gisborne, and 2YZ Napier). Questionmaster, Mr. I. G. Tabor; judges, Mr. M. H. Oram, M.P., and Mr. A. C. Buist.

The winners of these intermediate contests were: Otago-Southland, Ian Vercoe (Upper Manuherikia Club); Canterbury, Denis Frederick Power (Rangiora Club); Wellington, Gilbert James Evans (Carterton Club); and Auckland, William Allan Smith (Te Awamutu Club).

The final of the Dominion contest was broadcast over 2YA Wellington on Friday, March 18, on a national link, and was listened to with great interest by young farmers and others throughout the Dominion. The Minister of Agriculture, Mr. Cullen, was present in the studio, and the questionmaster on this occasion was the Hon. F. Waite, M.L.C., Balclutha, who has been associated with the Y.F.C. movement in New Zealand since its inception and who takes a keen interest in farming generally. Mr. R. B. Tennent, Assistant Director-General, Department of Agriculture, and Dr. W. M. Hamilton, Assistant Secretary (Agriculture and Biology), Department of Scientific and Industrial Research, were the judges.

The winner, Evans, left Auckland by flying boat for Sydney on Friday, April 8. He took part in the contest at the Royal Show, Sydney, remaining with the other competitors for 10 days as a guest of the A.B.C. This year's prizes were £25 for the champion and £10 for the runner-up.

Through all phases of the competition in the Dominion a very high standard was maintained, and a feature of the final contest was the farming knowledge revealed and the confidence displayed by the 4 competitors. It was fully expected that the New Zealand Y.F.C. competitor in the Australasian contest at Sydney would be a credit both to the organisation and to the Dominion which he represented. The New Zealand Federation of Young Farmers' Clubs is grateful to all those who assisted in the competition in various ways. The contest has done much to bring the movement to the notice of many radio listeners not intimately connected with farming.

A Patriotic Cow

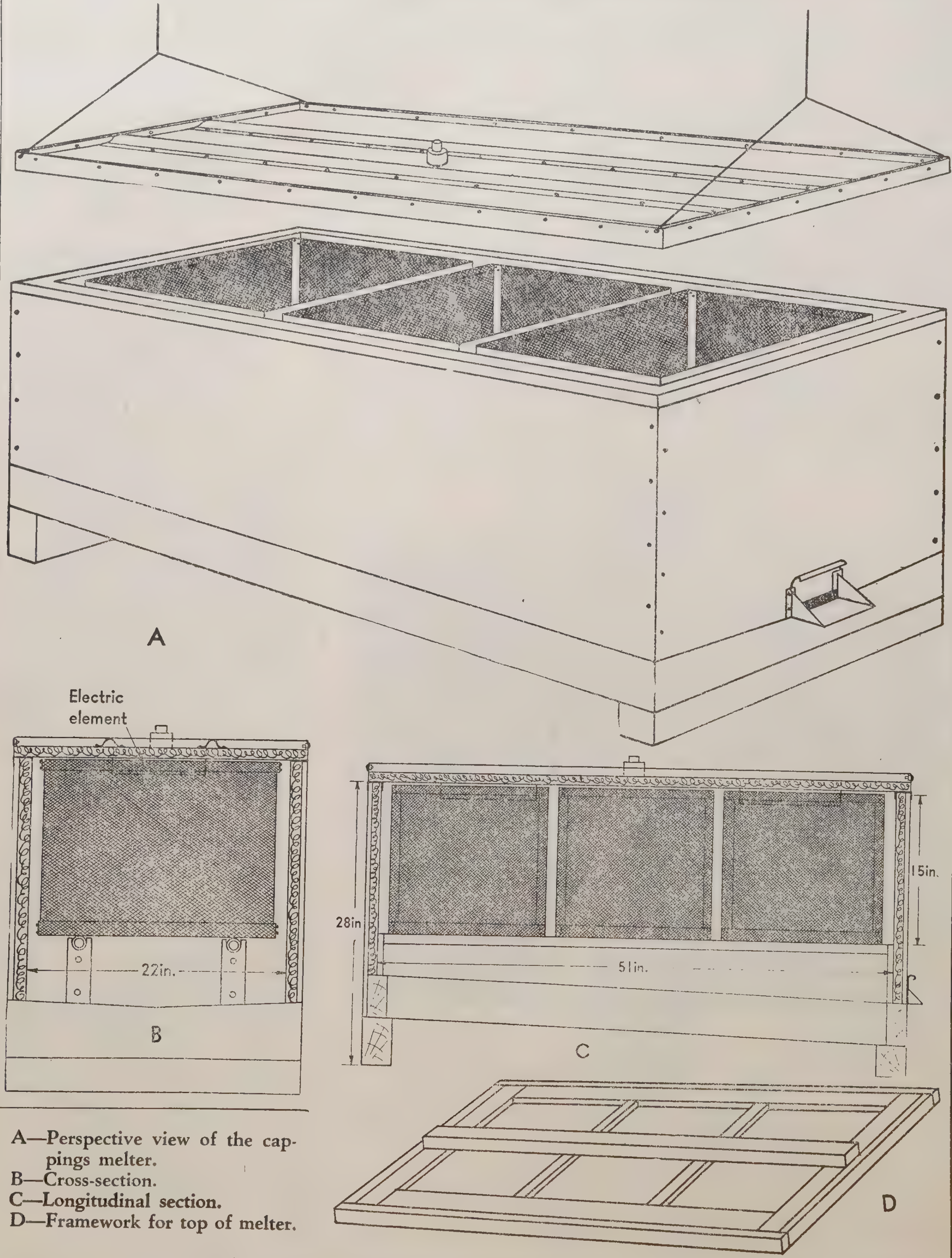
A blue roan Milking Shorthorn cow that exhibits a fecundity little short of a bovine record for 3 successive pregnancies is a member of the dairy herd of Mr. William J. Spring, Seadown, Timaru. The cow is now a 5-year-old and from 3 successive pregnancies she has produced 7 calves.

She first calved as a 3-year-old with twins, then as a 4-year-old with another set of twins, and on January 27, 1949, she calved as a 5-year-old with a magnificent set of patriotic triplets consisting of a red bull, a white bull, and a blue heifer. Their total birth weight was 160lb.

The photograph shows the cow and her 3 sturdy calves.

—*M. C. ARMSTRONG, Veterinarian, Department of Agriculture, Timaru.*

AN ELECTRIC TOP-HEAT CAPPINGS MELTER


A
Electric element
22in.
B
28in
51in.
15in.
C
D

A—Perspective view of the cappings melter.
B—Cross-section.
C—Longitudinal section.
D—Framework for top of melter.

Recovery of Honey and Beeswax from Cappings and Combs

By L. H. Johnson, Apiary
Instructor, Department of
Agriculture, Palmerston North.

NOW that the honey-extracting season is practically over, most beekeepers will have realised possible shortcomings in the system used to dispose of cappings. Almost all cappings melters will recover practically all the honey and beeswax, but often both are darkened in colour and the flavour of the honey is impaired.

ANY melter which operates so that the honey has to contact hot metal should not be given further consideration if it is desired to market the honey. The beekeeper's aim should be to recover honey of the same condition as that in the combs. The darker honeys appear to be more sensitive to heat than those of the very light colours. No cappings melter yet designed appears to be absolutely fool-proof. Certain principles to maintain cleanliness must be practised or a melter can soon become a very unsatisfactory appliance.

Other methods such as whirling the cappings in the honey extractor until they appear to be dry, or dealing with them in a specially-constructed type of press, will recover the honey in good order, but if the cappings are cold, a good deal of the honey will be left in the cappings and for this reason these two methods are not popular with a great many commercial beekeepers.

Electric Top-heat Melter

A melter which was designed and made by Mr. N. C. McKinnon, of Patea, has been used for the past two seasons, and although it may be possible to make minor improvements to it, the appliance as at present constructed appears to function satisfactorily. Cappings accumulating from a day's extracting can be successfully dealt with overnight and honey thus obtained appears to be in good order, as it does not come in contact with any heat.

The materials, which cost under £10, are obtainable, and construction of the melter, with the exception of the fitting of the electric elements, can be done by the beekeeper. A very great saving can thus be made, as a factory-made appliance would cost 4 or 5 times this amount.

Construction of Melter

The construction of the melter is simple. An oblong tank is made of 24-gauge sheet metal 4ft. 3in. long by 22in. wide by 19in. deep. This forms the inside walls. The outer walls are made larger to allow 1in. space on the sides and ends in which slag wool is placed for insulation purposes. Galvanised plain iron, black iron, or asbestos cement sheets should be suitable for the outer casing. If asbestos cement sheets are used, they should be screwed to light angle irons at the corners.

A capping piece of sheet metal with all joints made flush on top to fit over the inside and outside walls will cover the 1in. space holding the insulating material.

As it is not likely that any heat will reach the bottom of the tank, the lower cavity wall may be closed with a piece of 2in. x 1in. timber. A fall of 2in. toward the outlet should be sufficient slope on the bottom of the melter to ensure complete drainage of all honey. Three baskets to hold the cappings, each measuring over all 16in. wide x 20in. long x 15in. deep, are made of ½in. mesh wire-netting fastened on to a framework of hoop iron either riveted or welded together. These cappings containers rest on a pair of ¾in. water pipes which run longitudinally. These basket supports are better made movable than fixed, as this is an advantage when removing wax from the bottom or when washing the melter. Two metal uprights to carry the ends of the pipes should be riveted and soldered to the wall at each end of the melter. A strong job is required to carry the weight of the baskets when full of cappings. The top of the pipe should be 15½in. down from the top edge of the melter, and this should leave a space of about 6in. under the basket at the outlet end.

A simple and effective gate may be made to work as a slide. The opening required is 4in. wide by 2in. deep. This is specially suitable for controlling the flow of honey and retaining the wax inside. A suitable stand may be built of timber as illustrated, showing the provision of a toe space for more comfortable working. The lid shown is made of galvanised flat iron and is the same size as the melter. A 1in. space is provided for slag wool insulation. To strengthen it on top two ridged strips of sheet metal are riveted on. Light T irons would also be suitable or, if obtainable, a sheet of corrugated galvanised iron would be strong enough to prevent sagging.

Two electric oven elements are fitted to the underside of the lid to supply the heat required. The closed element used on the top of an electric range would also be suitable. All bare wiring from the elements to the switch in the centre on top are run through small porcelain rings to give protection and insulation.

Another handy idea is the provision of a light block and tackle to hoist the lid up to the ceiling so that it is out of the way while combs are being uncapped.

A wooden framework to rest on top and telescope the outside for 1in. will not only cover the space between and outside the baskets so that cappings can fall only inside where intended, but will also provide a firm support on which to attach the bar for holding frames while uncapping. It must, of course, be removed before closing the lid.

Operation of Melter

Hoist the lid up to the ceiling out of the way and place the wooden framework in position. A piece of scrim should be laid on the bottom of each basket to retain the slumgum. Combs are uncapped direct into the baskets until each is filled. This will be a day's work for one man, during which time honey will be draining into the compartment below.

If the gate slide is raised ¼in. it will allow the honey to flow through but will not permit any liquid wax to escape.

The cappings should be levelled out, the lid lowered into position, and the heat turned on. The lid is fairly weighty and should fit neatly to avoid much heat escaping, but if some of the steam and gases do escape under it, it may be an advantage.

It is not advisable to leave the cappings to drain for a few days, as they set and it is then much more difficult to achieve separation. The heat should be applied while they are saturated with honey, when there is a much quicker get-away.

As beeswax is a non-conductor, little if any heat will penetrate the mass of cappings, only the top ½in. of which will melt and continually run off, the honey always escaping down through the cappings or out the sides of the baskets into the space below and out through the slide. Any melted wax which will run out through the sides of the baskets will chill and remain in the lower compartment. The scrim on the bottom of the basket will retain the slumgum.

When after about 7 hours honey ceases to run out of the exit the heat may be switched off, the lid hoisted up, and the scrim containing most of the slumgum can then be removed.

After the three baskets and two pieces of piping have been removed the wax may be lifted out in pieces to be later melted up in a copper boiler and run into moulds.

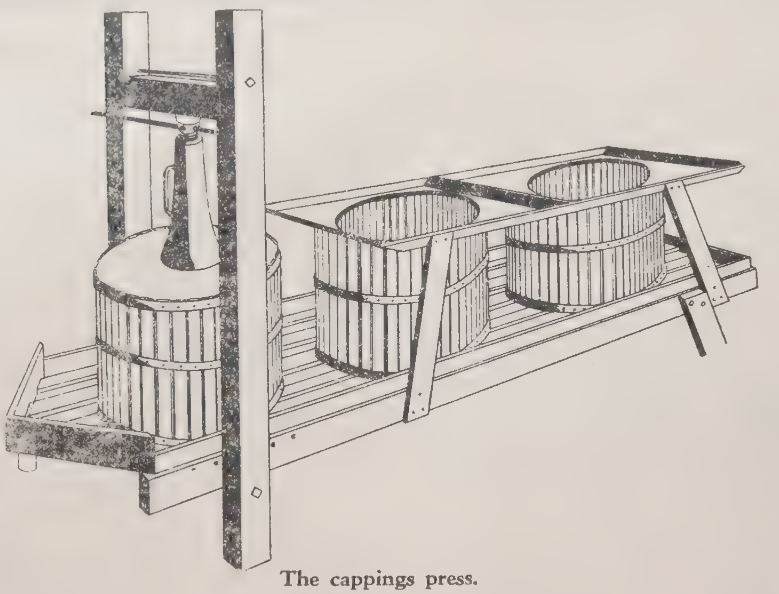
The baskets must be thoroughly cleansed of all slumgum and burnt honey before being used again. A suitable solvent which will quickly remove this tenacious residuum by means of ordinary washing methods has not yet been discovered, but thorough cleansing is possible if the baskets are immersed in water and boiled for some time. It has been stated that the addition of a soap powder to the water greatly assists the cleansing action.

The size of the baskets is such that it would require a 40-gallon drum with a fire under it to do the boiling properly. If more but smaller baskets were used, they could be treated in a 16-gallon copper boiler.

The boiling will make the baskets as clean as new ones, and although it takes time, it must be attended to, as no fine-flavoured honey will come out of a blackened melter. On no account should the melter be used time after time and the cleansing left until the final wash-up at the end of the season.

If the melter is properly insulated to retain the temperature and the baskets are clean, this melter will recover honey and beeswax from the usual type of easily-extractable honey in a better condition than can be done by the majority of melters in common use.

HONEY RECOVERY BY CAPPINGS PRESS



The cappings press.

Honey is difficult to recover in good condition from cappings containing a considerable quantity of manuka honey.

Cappings Press

Another method of recovering honey from cappings is by pressing them in a specially-constructed appliance. This can be made to work satisfactorily only in a continuous warm temperature. Many beekeepers have recently incorporated in their honey-extracting buildings a small insulated warming room. Supers of honey when brought out of this compartment are ideal for extracting. Under these conditions the press can be fairly successfully used. The honey thus obtained is in good order and the small amount left in the wax may not be worth recovering.

Like the melter previously described, this appliance can be home made and thus considerable savings can be effected.

Method of Construction

The method of construction of the press is illustrated on this page. A bench with a slight slope to one end is built of 5in. x 2in. bearers, 4in. x 2in. legs, and decked with 1in. thick boards. The two uprights are 4in. x 3in. with a top cross-piece of 4in. x 4in. To take the strain of the screw under the decking two 9in. x 2in. pieces of timber, running crosswise, are checked ¾in. into the 5in. x 2in. bearers between the uprights. The framework should be held together by two ½in. tie bolts, one above the top bearer and the other below the bottom cross-piece. A metal drip tray with a 1in. turn-up on all sides and tapering to the outlet is made to the same dimensions as the bench.

On top of this a grille made of strips of 1in. x ⅞in. timber and spaced at approximately 2in. intervals the full length of the tray will provide channels for honey to flow to the exit.

Three circular tubs of 18in. diameter and 15in. high are made of 1in. x ⅞in. staves spaced each 3-16in. apart on the inside and each riveted to three metal bands. The bands should be of heavy hoop iron approximately 1in. wide and ⅛in. thick. If each of these bands is jointed and held together by a bolt, the bands can be unscrewed and the tub allowed to spring open a little for easier removal of the block of wax after pressing. A circular top and bottom each made of ⅞in. thick timber screwed together with the grain of each piece placed at right angles will complete the tubs.

It is an advantage for uncapping combs to make an oblong framework to be supported and kept in position above the tubs by four uprights. The outside of the frame is made of 4in. x 1in. timber and the rest of the timber is ⅞in. thick. The frame should slope inward and the circular openings should be a little smaller than the top of the tubs.

Pressure may be obtained by using a long, heavy screw which will pass down through the cross-beam and a plate tapped to take the thread. Another piece of heavy plate iron should be screwed to the centre of the circular lid to withstand the end of the screw. A bottle jack could be made use of instead of the long screw. It would work under the beam. There are no precision measurements given, as a good deal of latitude can be allowed.

The taller and narrower the tubs are the better the work will be, because the only escape provided for the honey under pressure is horizontally.

The height of the framework should be from 2ft. 4in. to 2ft. 6in. from the floor to be right for uncapping. On the other hand, the minimum height of the exit should allow for honey draining off to run into some receptacle, unless the building has a lower floor, in which case the bearers could be set on the floor.

How the Press Works

Two tubs are placed in position under the top framework. Combs of honey are then uncapped into one tub until it is filled, after which it is slid along under the cross-beam, the lid is placed on top, and pressure is applied by the screw or bottle jack. Honey will squeeze out between the staves and run down the outside on to the tray and then drain off into the receptacle provided.

Uncapping is then continued into the next tub, while at intervals more pressure is applied. It will take about 3 hours to get the cappings down to a solid block from which no more honey will be yielded.

To remove the wax unscrew the bolts holding the hoops together and spring the tub open a little. The circular blocks thus removed may be stored for melting down and clarifying when convenient. If uncapping is continued until the end of the day, the press will still require attention at intervals for another 3 hours.

The domestic beekeeper may not consider it worth while making either a cappings melter or a press to deal with a small amount of cappings, but if cappings are placed in a container with a wire-screen bottom they will drain comparatively dry when kept in a warm temperature. Drainage can be further aided by breaking the cappings up so that there is no place for honey to lodge and also by turning them over occasionally with a wooden spoon.

The bulk of beeswax is secured from cappings and is by far the best quality. If treated correctly, it should not be darker than butter. Often it is found when uncapping combs that the top bars are heavily coated with propolis, in which case it should not be trimmed off and put in with the cappings, as in addition to tainting the honey the wax is also stained.

Inferior combs will show up at extracting time and later when sorting dry combs. Every year a number of these require to be rendered down and the wax thus obtained converted into comb foundation. The only satisfactory appliance yet devised for this purpose is the Hatch wax press. The methods of operating it have been previously dealt with in the "Journal," and it is described in most beekeeping textbooks, including Bulletin No. 267 of the Department of Agriculture.

Discoloration of Wax

Only rainwater should be used for the washing of the combs, as water from reservoirs will often discolour wax. Old bee combs should be placed in a tank filled with rainwater and allowed to soak for 24 hours or more. After the combs have been well stirred up to wash them the water should be run off. It is surprising how much colouring matter can be carried away by this simple means.

Hot wax should not come in contact with iron.

Large presses, in addition to not recovering all the wax, will turn out an inferior product.

A dark-brown wax with a slight greenish shade is mainly caused by unsuitable water, contact with iron, and prolonged heating.

The colour and texture of many lots of beeswax either for conversion into comb foundation or for the market is such that there appears to be a need for improving the methods of treating it.

PARENTS' ROLE IN THE CHILD'S EARLY YEARS

FOR the past 30 years a veritable army of men and women have devoted all their time, energy, and ability to the study of infant growth and development and have discovered much that is useful. The purpose of these articles is to put country parents in touch with some of their findings and to indicate where they can find more information, for if parents are to benefit by the findings of research, study is required. The provision of food, clothing, and shelter is not enough for the well-being of children; they need wisdom and understanding—in fact that need is probably the greatest stimulus to the development of wisdom and understanding in parents. Some vital responsibility in the care and nurture of the next generation is necessary to maturity, and it is a paradox that one needs to be mature to handle children wisely. Intelligent and effective care of children has thus real value for adults, being a task which is one of the most stabilising of human experiences.

THERE is beginning to be an awareness of the importance of providing assistance for parents in the discharge of their great personal and social responsibility—not to relieve them of it, but to aid them. After all, only the parents have the continuous opportunity to lead children from infancy to maturity.

Home a Personality Workshop

Children must be thought of as being more than arms and legs, always tearing clothes and getting into trouble; eyes and ears, ever seeing and listening at inconvenient times; and stomachs and other internal organs, sometimes out of order. They have a mental and emotional life far more delicate and complex than their physical bodies, far more difficult to keep in order, and more easily put out of adjustment. They live real mental lives, full of hopes, ambitions, doubts, misgivings, joys, sorrows, and strivings that are thwarted or gratified at the age of three as much as at the age of 30.

The home is the workshop in which character and personality are made or moulded. As the significance of parent education is realised, the first impression is that the present generation of parents has had no formal preparation for its work. The way parents feel and act toward each other, their attitudes toward money, work, leisure, recreation, sex, display, gambling, religion, friendship, politics, citizenship, individual dignity, and all vital family experiences, constitute the material which each child must use to build a life. The intimate relationships of family life may develop social skill or clumsiness, self-confidence or self-depreciation, courage or fear, cordiality or suspicion, generosity or selfishness. And too often parents' attitudes and practices are just haphazard. They are surprised at the results because they have not studied them enough to become aware of the real environment of their children.

INFANTS are one of the greatest joys of life, but they bring a great responsibility to parents to see that all the potentialities of the child are allowed their fullest expression. This article, the first of a series by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, has been written for parents who wish to benefit by the findings of research in child care and development to assist them to an easy understanding of important aspects of the problem of how best to bring out such latent qualities in the growing baby as independence and self-reliance, so that a great social responsibility can be discharged, to the continued happiness of both parents and child.

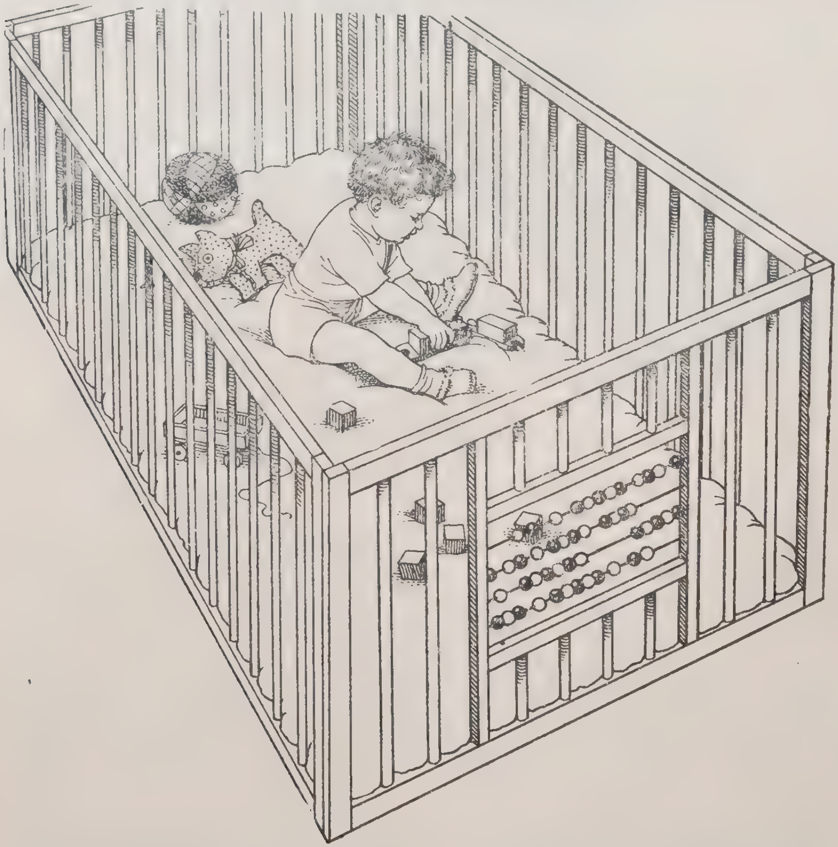
Difficult Parents

To write from the point of view of the child's problem with difficult parents would be easy. Do you recognise yourself anywhere here?—Parents who scold; are inconsistent; are discourteous to their children; are like machines; have no imagination; make themselves their children's slaves; rob their children of responsibility; play on the heartstrings of their children; punish injudiciously; are always looking back; enkindle fears in their children, and even teach their children to be untruthful or tempt them to take what is not their own. Are some of those descriptions of the attitudes and actions of parents astonishing, perhaps especially the last three? They can be seen in others, if not in one's self.

However, Dr. G. C. Myers, who wrote from this point of view and is himself a parent, added the following:—

"When I see what I, as a father, should be and should do, alongside what I am and have done, the difference sometimes frightens me. But when I detach myself, and as another person look at myself in an objective fashion, I can see why I have made some of my mistakes, feel more charitable toward myself, regain some self-confidence and some self-esteem. I can see some things I have done very well, some achievements I feel proud of. Also I can see some ways of improving some other things I have not done so well. Of course, none

PARENTS' ROLE IN THE CHILD'S EARLY YEARS



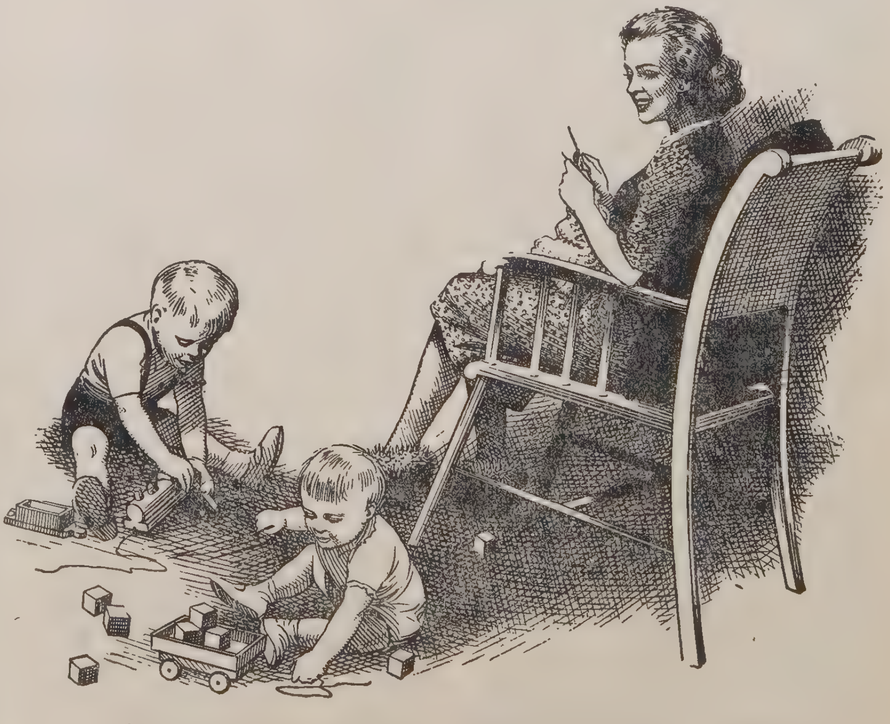
Independent play. Parents' help need be given only if the child meets with real difficulty, such as toys straying outside the play-pen.

of us can take an attitude entirely objective. At least, I seldom can. It may encourage others somewhat to know that the author has often felt rather 'blue' while calling to mind the many concrete instances on which the materials for these points have been built. But they form a mirror in which you can look and see yourself about as your children see you."

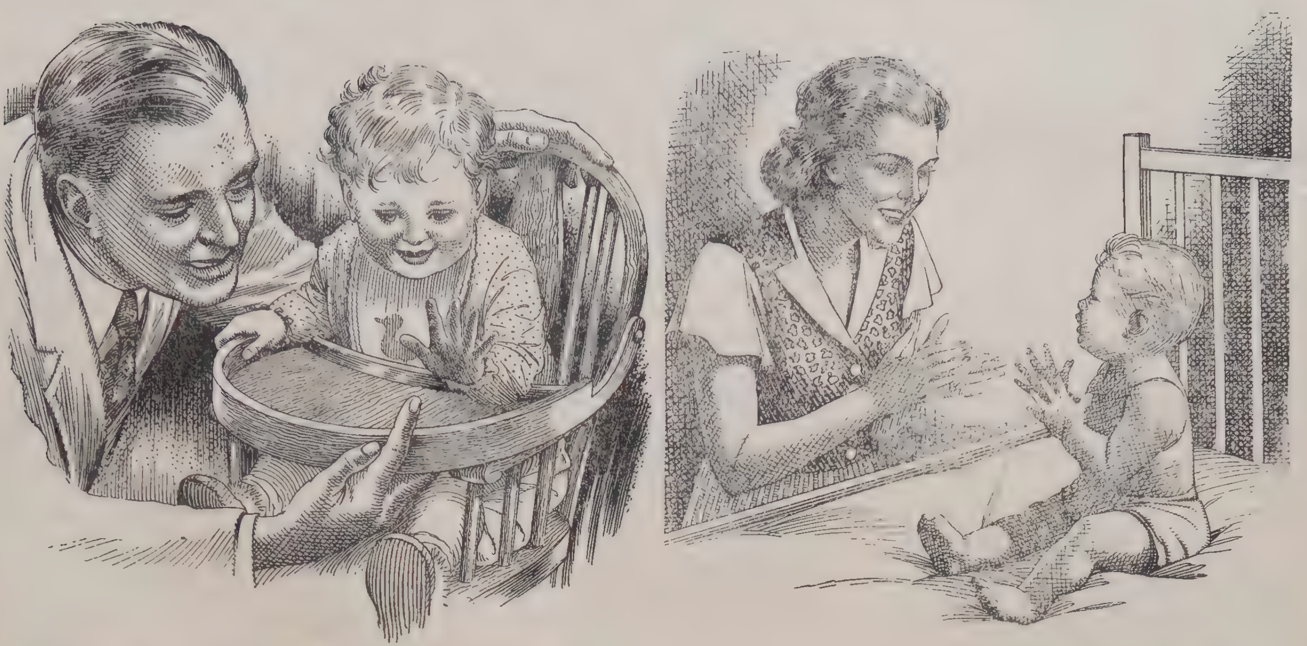
Needs of Children

These articles are written by an ordinary parent, and not from the expert's point of view. The writer has been privileged to meet a number of specialists in child care and development personally, both in New Zealand and abroad, and many more through their books. They have opened to her a new world of ideas and interest in what is the most happy and satisfying, if also the most difficult, task in the world—that of bringing up children. It has been the endeavour of the writer to keep in mind the conditions in the home where the care of children is part of a larger life and a wider group of relationships and duties.

Though it is undoubtedly true that the country is the best place in which to bring up children—in fact, country-bred children are one of a nation's most important products—it is also true that few country mothers can benefit from the help available to city mothers in the growing number of nursery schools, kindergartens, and play groups, using modern research knowledge to provide a suitable background and occupations for the child in preschool years. Country mothers have to carry out unaided the important task of early training. It is hoped that the articles in this series will outline to the busy mother ways in which a child's mental development and manual skill, as well as his social and emotional life, can be happily guided. A child need not be bored or spoiled in the early years. Often, however, a mother's ideas of children's play and occupations are vague, while her household duties leave her little time to read widely enough on the subject, even if she knows where to search for the information. Games and occupations will be suggested which will serve the child's mental needs and may be carried out while the mother is busy about the house, though from time to time she may stop to share in her child's play and interests. It is not expected that each mother can make use of all the material but rather that she will select those occupations and games which she finds most suitable for herself and her children. Efficient housekeepers need to use their skill to master their whole household routine and make more time to experience life **with** their children. However, beware of allowing efficiency to be used in building up higher and higher material standards to which the real welfare of the children is sacrificed. The fundamental needs of children can be met better in a country



Playing in Mother's company—"Mummy, look what I'm doing."

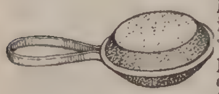


For some part of the day parents should play wholeheartedly with their children. The right to companionship and sharing with parents in play and pleasure belongs to children as surely as the right to be shown the way to independence and self-reliance.

home than in a city one if parents are not beset with too great hardship and overwork and do not set a standard of household order so particular that the children are sacrificed. Happily for country children they have many outdoor interests, but their parents should be aware of, and plan for, a variety in play for them.

Planning the Play Time

By looking back over the earlier years, parents can see the advantage of three different kinds of playing time. The first is when the children play alone with suitable toys and materials. Then help is given only in real difficulties, with a greeting as parents pass from one piece of work to another. That is where the play-pen gives invaluable service. The foundations of independence are laid in this way, and parents who teach their children to be self-reliant make a big contribution to their future welfare and happiness. Some people grow up discontented and unreliable because they have acquired the habit of looking to others for all their entertainment and satisfaction; their parents probably anticipated even their desires. Such people are more likely to crumple up in the emergencies of life. Readers of "The Saturday Evening Post" will probably recall a long article by a psychiatrist to the American Forces in which he unhesitatingly laid the blame for the failure of many thousands of young men on their home life.



Children should not be left to their own resources for too long. A second kind of playing time should be planned for, when the children are in the parents' company—there to be appealed to, to set the standard of approval on their efforts. "Mummy! look what I've made." The reply should be a smile and nod of pleasure, inspiring confidence for further effort, though the mind of the adult be busy elsewhere.

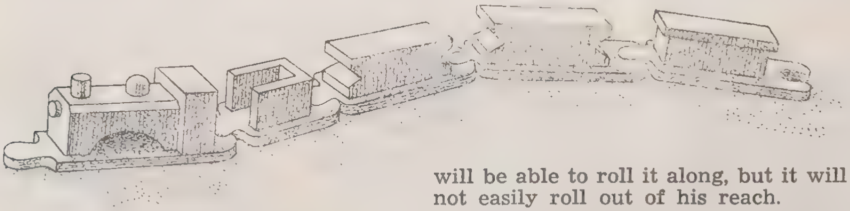
For some part of the day, however, parents should play really wholeheartedly with their children, from finger and toe play in the very early days to games of skill like draughts, patience, and table tennis later; or from nursery rhymes and jingles to family singing and music making. Charades, plays, and make-believe games have their place at this stage. Some parents extend this type of play and companionship to their children on journeys, running competitions to spot familiar landmarks, making the trip an adventure looked forward to from year to year.

The right to companionship and sharing with parents in play and pleasure belongs to children as surely as the right to be shown the way to independence and self-reliance. Such experiences build up good, confident patterns of relationship with others, leading to valuable social skills and the power to co-operate happily and easily in adult life.

Value of a Play-pen

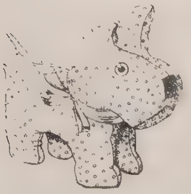
Training for playing and being happy alone starts at a very early age—in the pram and in the play-pen. It is not really necessary to persuade busy country mothers (or town mothers for that matter) that play-pens are useful; and few in New Zealand have had to go without them as they have had to overseas in these recent difficult years. But some mothers find that their children cry all the time they are in a play-pen; that is probably because they were not put there early enough. The baby should be used to going into his play-pen long before it is necessary to keep him anchored. If it is left until he can crawl round the room, he will resent being shut up, but if he has been used to sitting inside the pen with his toys, the limits of the pen become fascinating to explore when he can propel himself. In the pen he plays and moves at his own pace, laying the foundations of self-reliance and the difficult art of concentration.

PARENTS' ROLE IN THE CHILD'S EARLY YEARS



But a play-pen has a limited period of usefulness, both in the day-to-day programme and over a period of development. There comes a time when his growing urge to move about and explore must be given wider opportunities. Too much of the play-pen then can limit his growth and delay and hamper his mastery of the art of walking.

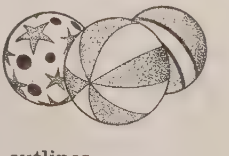
Play-pen Toys



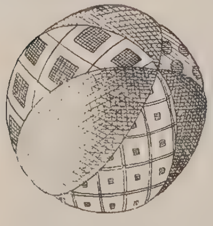
Here is what Hilary Page says about play-pen toys:—

"These can all be made at home, and they can be made to satisfy his needs in three directions:—

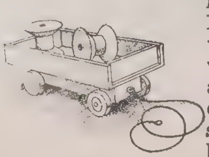
"A soft animal to cuddle, and talk to, and so that he learns to like animals. Red is the popular colour and American cloth a suitable material. The toy should stand up by itself. Leave it in the play-pen as an added attraction to going there. Make another one for play in the pram or to take to bed. Good patterns are obtainable but many mothers have drawn their own outlines.



"A crawler's ball, which should be large, loosely filled, and about 8in. in diameter. Cut six pieces of washable material (American cloth of a different colour and pattern from those of the animal) tapering at both ends. Sew them together inside out. Turn the pieces out the right way just before the sewing is completed and stuff the ball loosely with cottonwool. It must be so soft that he can really get a grip on it with his fingers. He will be able to roll it along, but it will not easily roll out of his reach.

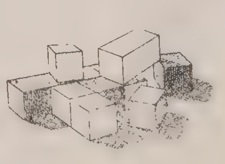


"A small wagon and blocks, which will give him the idea of things on wheels. Sooner or later he will see that he can load little odds and ends into the wagon and push them round from place to place. Any little wooden box will do for the body of the wagon, and the wheels can be improvised from wood or metal if they cannot be bought. Draughts with a hole bored through the centre make very good wheels, should you have an incomplete set. Rub down the wood of the box with sandpaper and wax it. If daddy wants to show his prowess by making an engine or baby's first train, now is the time. An engine and three or four little wooden wagons which hitch on behind are a never-ceasing source of delight. Each piece needs to be but 6in. long for play-pen use.



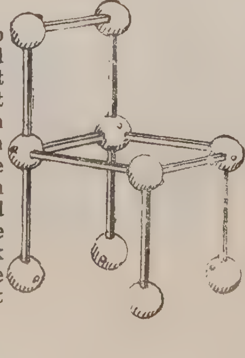
Home-made Blocks

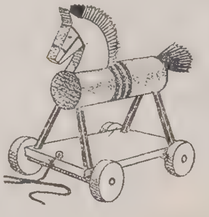
"With this toy he is now ready for blocks. Wooden or plastic ones will soon be easier to obtain, but here is a description of an excellent set which a mother made by pasting coloured wallpaper over matchboxes. Before covering them she filled them with sand to make them stronger, but perhaps it would be better to stuff them full of paper before sealing and covering them. Odd pieces of wallpaper are to be found in almost all homes. First paste a strip right round the long way of the matchbox, and then another strip of the same colour right round at right angles to the first one. The block will be stronger if that operation is repeated so that there are four thicknesses of wallpaper round each box.



"Do not try to make him build with them straight away; first let him play with them in his own way. He may be most interested in the colours and will try to decide why they all look different. Then he may like to put the blocks into designs or patterns, and finally he will learn that they can be piled up.

"He will enjoy it far more if he discovers that for himself than if it were shown him, and if he is not able to do what you have done he may get irritated and lose all interest in them. They will hold their appeal much longer if he goes on finding out for himself new possibilities with them. They will make ideal loads for his train or wagon, too. Add a few cotton reels to make up the number if you cannot get enough matchboxes. A collection of round pebbles of different colours, with a linen or cloth bag to hold them, will make a good standby in the event of a shortage of blocks."





Reading for Parents

These articles will not attempt to deal as systematically as a textbook with the whole wide subject of child development. Other suggestions will come from reading. Good material is available to country mothers from the adult education sections of the university colleges and to those who are fortunate enough to be in contact with the Country Library Service. Write to the Director of Adult Education in the university college of your district for information about written material available to country parents. The Country Library Service has an excellent collection of interesting modern books on children, parenthood, and families. Ask the visiting librarian.

Here are the names of a few books in which can be found help and information:—

"The Nursery Years," Dr. Susan Isaacs.

"The Natural Development of the Child," Dr. Agatha Bowley.

"Home Training for Young Children," H. M. Heaton.

"Our Children in a Changing World," Wexburg and Fritsch.

"Toys in Wartime," Hilary Page.

"Child Psychology," 10 lectures by Miss Doreen Dolton, M.A.

"Books for Children" (10).

"Reading for the 'Teens," by Miss E. M. Smith, M.A.

"Home and School."

The last four may be obtained from any of the adult education centres of the university colleges.

Correspondence is invited from parents. Short descriptions of successful practices in the care and development of children on lines indicated in this article will be welcomed.

APPETISING FISH MEALS

IN country districts fish meals are usually possible only after a trip to town shops, the visit of a travelling fish vender, or a successful fishing expedition. Because of its infrequent inclusion in the menu, particularly in the more isolated inland districts, many country housewives have not a great variety of methods of cooking it. Fried fish is certainly popular, but there are other ways of serving appetising fish meals, and some of the methods are described in this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland.

As the freshness of fish is most important, it is essential to know the points to examine when selecting it. When fish is stale it is limp, the eyes are grey and sunken, the scales are dull, and the flesh may have a transparent appearance; very stale fish has a most unpleasant smell. Fresh fish has a fresh, salty odour and is firm and slippery, with bright, shining scales. The flesh is clear and white and the eyes are bright and protrude slightly.

Though fish bought at a shop or van is almost always cleaned and at least partially prepared for cooking, it often needs some further attention before it is cooked. Scrape off any remaining scales and the black skin from the inside and make sure that no blood is left in the backbone. If the tail and fins need to be taken off, a pair of scissors will do the job more easily and quickly than a knife.

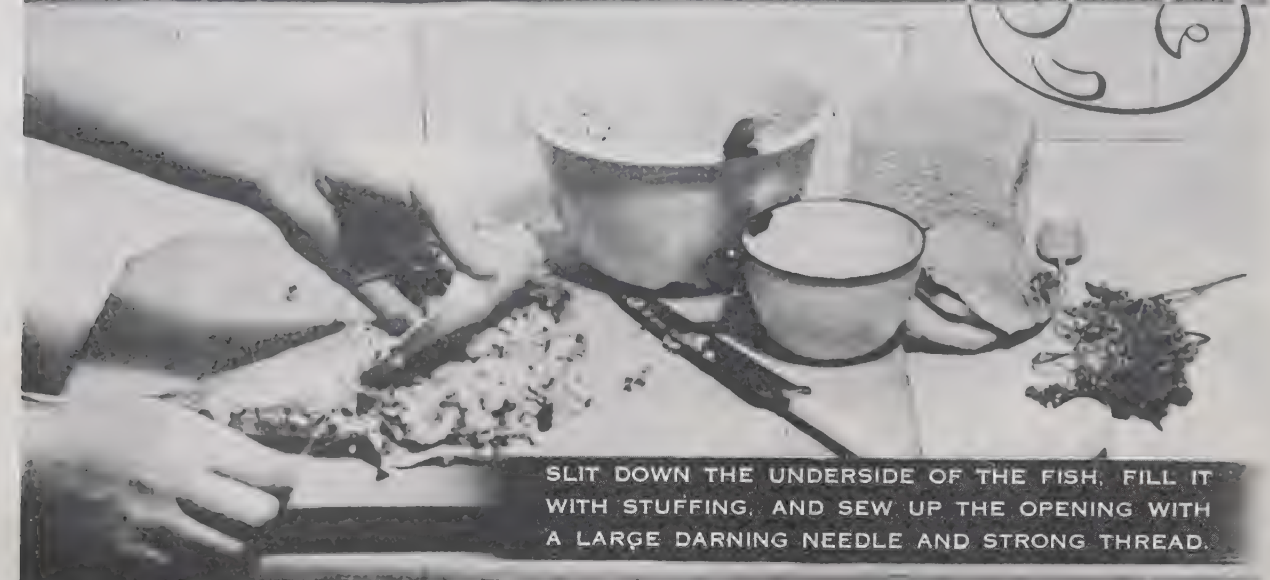
To fillet fish take a sharp knife and make a long, straight cut down the back; then, starting at the head end, make broad cuts against the backbone down to the tail end, thus removing the flesh from half of one side. Turn the fish round and finish cutting the fillet from the other half in the same way, then turn the fish over and cut off the second fillet. A large fish may be filleted in four separate pieces by making a cut through to the centre of the backbone on either side of the fish.

Flat fish (flounder or sole) has a better appearance on the table if the dark skin of the upper side is removed. Make a cross cut just above the tail, slip

---

Heading photograph by Sparrow Industrial Pictures Ltd.

BAKING WHOLE FISH



SLIT DOWN THE UNDERSIDE OF THE FISH, FILL IT WITH STUFFING, AND SEW UP THE OPENING WITH A LARGE DARNING NEEDLE AND STRONG THREAD.

BAKED IN A MODERATE OVEN AND BROWNED, THE FISH MAKES A TEMPTING DISH WHEN IT COMES TO THE TABLE.

[*Sparrow Industrial Pictures Ltd. photos.*

the point of the knife under the skin, and loosen a flap. Dip the fingers in salt so that the loosened skin can be grasped more easily and work the thumb up between skin and flesh on both sides of the fish to free the edges. Grasp the loose flap of skin, pull it firmly away from the tail end, and the skin will come off in one piece.

If the fish has just been caught and has to be cleaned, cut off the fins and the head, then, holding the fish by the tail, take off the scales with the back of a short, heavy knife blade, scraping from the tail toward the head. Cut off the tail, make a slit in the underside of the belly, and remove the entrails. Wash the fish thoroughly in salted water, then finish the preparation as already described.

Methods of Frying Fish

According to the size and kind of fish, it may be fried whole, in fillets, or in steaks. Deep or shallow fat can be used and the pieces of fish should be dipped in flour or oatmeal, and coated with egg and breadcrumbs, or crushed flaked cereals, or covered with batter. The various coatings retain the flavour and moistness of the fish and also prevent the fat soaking in during the frying.

To prepare fish for frying wipe the pieces with a damp cloth. Dip the pieces into flour, ready seasoned with salt and pepper. Beat 1 egg lightly with 1 tablespoon of cold water and pour the mixture into a shallow dish or a plate; have ready sufficient crisp, dried breadcrumbs on paper, a board, or another dish. Dip the fish into the egg mixture and coat both sides, lay it in the breadcrumbs, and sprinkle it thickly on the upper side. Lift the fish on a fork, letting any surplus crumbs fall off, and put it at once into smoking hot fat. Soft breadcrumbs, crushed flaked cereal, oatmeal, or small rolled oats may be used instead of crisp breadcrumbs. When eggs are scarce the floured fish may be dipped in milk instead of the egg mixture if oatmeal or cereal is used for coating.

For frying in batter the floured fish should be dipped into the prepared mixture, lifted with a skewer or fork, and allowed to drain a little before being lowered gently into the hot fat. The following two recipes, one of which uses no egg, are for batters suitable for coating fish:—

2 heaped tablespoons of flour
¼ pint of milk
Salt
Pepper

Stir the mixture until it is quite smooth. A pinch of baking powder may be added just before using if desired.

1 egg, beaten
2 tablespoons of flour
Salt
Pepper
Milk to mix as needed

Blend and stir until free from lumps.

Deep Frying

For deep frying heat 1 to 1½lb. of clarified dripping in a heavy deep pan until faint-blue smoke rises, then put in the fish one or two pieces at a time. When the coating is crisp and golden-brown lift the fish out on to a hot dish covered with kitchen paper to allow the surplus fat to drain. Keep the dish in a hot place until the rest of the fish is ready. Transfer it to a hot serving dish and garnish it with parsley and slices of lemon or quartered tomatoes.

Shallow Frying

In shallow frying enough fat should be used to cover the bottom of the pan well. Heat it until faint-blue smoke rises, then fry the fish or fillets on one side until they are golden-brown. Turn them, using a fish slice and knife, and cook them on the other side. Lift them out on to a paper-covered dish to drain.

Accompaniments for fried fish are chipped potatoes, fried mushrooms or tomatoes, and lemon, parsley, butter, or a thick, sharp sauce.

Grilled Fish

Before grilling fish wipe the fillets and brush them over with melted butter, dripping, or bacon fat. Place them on a greased grill tray and cook them under the top element of an

FISH SALAD, MADE WITH FISH, LETTUCE, CUCUMBER, AND TOMATOES.

[Sparrow Industrial Pictures Ltd. photo.

electric stove or on the top shelf of a fuel range. Turn the fish two or three times during grilling and sprinkle them with salt and pepper when half cooked. The cooking time depends on the thickness of the fish, 1in. thick steaks taking about 8 to 10 minutes.

Boiled Fish

For boiling, the coarser-grained fish such as hapuka, groper, kingfish, or large snapper are the kinds to choose. They may be small, whole fish or larger ones cut into thick steaks. If the fish is cooked whole, the head is sometimes left on, but the eyes are, of course, removed. The fish can be pinned into a cloth or put on a heat-proof plate with a cloth wrapped round it so that there is less chance of breaking it when it is taken out after cooking. Put the fish into sufficient hot, but not boiling, water to cover it, and allow 10 to 15 minutes' cooking time (according to thickness) for each pound. Add salt in the proportion of 2 teaspoons to each quart of water and 2 teaspoons of lemon juice or vinegar to keep the flesh white. A few peppercorns and one or two cloves may be added to the liquid if preferred. The water must not boil while the fish is cooking, but only simmer. Boiled fish should be sent to table immediately it is ready, because it soon spoils if it is kept waiting. As a good sauce is a necessary accompaniment for boiled fish, parsley, egg, or brown butter sauce should be served.

Steamed Fish Fillets

For small children or invalids fillets of fish can be cooked on a deep plate covered with another and placed on top of a saucepan of boiling water. Rub the plate with butter, lay the fillet on it, and sprinkle the fish with salt and put a small pat of butter on top of it. Cook it until the flesh is white and has a slightly-curdled appearance. A tablespoon of milk poured over the fillet before cooking will give extra flavour and will also make a little sauce.

Baked Fish

Fillets, steaks, large cuts, or whole fish may be baked in the oven. Use an ovenware dish, grease the sides, and put in the fish. Fillets may be floured, dipped in milk and then in breadcrumbs, and arranged in overlapping rows or they can be rolled up and set side by side so that the loose ends do not unroll while cooking. Dot them with butter and pour in a little milk; cover them with greased paper for most of the cooking time to prevent the top becoming too dry. Large steaks need sufficient milk to come half-way up the sides.

Whole fish, filled with well-seasoned stuffing, are baked on a flat ovenware dish. The recipe for the stuffing and the method of cooking are as follows:—

Stuffing

1 cup of soft bread-crumbs
1 tablespoon of chopped parsley
1 small teaspoon of mixed herbs
1 teaspoon of finely-chopped onion
Salt
Pepper
1 egg, slightly beaten

Mix the dry ingredients together and moisten them with the beaten egg. Prepare the fish, leaving the tail on. Slit down the underside, fill it with stuffing, and sew up the opening with a large darning needle and strong thread. Lay the fish on a well-greased baking dish, dot it with butter, and cover it with greased paper. Bake in a moderate oven (375 to 400 degrees F.), allowing about 10 minutes per pound. Remove the paper for the last 10 minutes to brown the fish lightly.

Pickled or Soused Fish

Oily fish like trout or mullet is very good when pickled or soused. Clean the fish and cut it into neat pieces. Lay it in a pie-dish with some pickling spices to taste, say, a few peppercorns, two or three cloves, whole allspice, and one or two chillies. Sprinkle it with salt and pepper and barely cover it with vinegar. Cover the dish with a plate or greased paper and cook the fish gently until it is tender. Serve it cold with salad.

Smoked Fish

Smoked fish of any kind can be boiled in water or milk or grilled. Usually the skin and bones can be removed easily before cooking. Cut the skinned fish into portions and put them into a shallow pan. Pour in milk and bring it to boiling point slowly and hold it at this temperature for 1 or 2 minutes. Remove the fish, thicken the milk with flour or cornflour, and cook and pour the sauce over the fish. For variety chopped parsley or chives can be added to the sauce.

Left-over Fish

Left-over fish may be utilised in any of the following recipes.

Fish Cakes

1 cup of cooked flaked fish, smoked or fresh
2 cups of mashed potatoes
1 egg, slightly beaten
1 dessertspoon of chopped parsley
Salt to taste, according to whether fish is fresh or salted
Pepper

Mix the ingredients together and form the mixture into round, flat cakes or balls. Roll them in crisp breadcrumbs and fry them in deep, hot fat for 3 to 5 minutes. Drain them on paper, decorate them with sprigs of parsley, and serve them with lemon slices.

Fish Custards

1 cup of cooked smoked fish
1 tablespoon of chopped parsley
1 teaspoon of finely-minced onion or onion juice
Pepper
Salt if necessary
2 eggs
1 cup of milk

Flake the fish, remove the bones, and add the parsley, onion, and seasoning. Beat the eggs well, add the milk, and stir in the fish mixture. Pour the mixture into individual greased custard dishes and bake it in a moderately-slow oven until set (½ to ¾ hour at 350 degrees F.).

Fish Envelope

1 cup of cooked fish
1 tablespoon of parsley, chopped finely
1 teaspoon of lemon juice
1 egg
Salt
Pepper
Short pastry
½ cup of mashed potato or soft bread-crumbs

Flake the fish and mix it with the other ingredients. Roll the short pastry into a square, spread the centre with the fish filling, moisten the edges, and fold the corners to the centre envelope fashion. Bake the mixture in a hot oven until the pastry is cooked and slightly browned. The top may be brushed with beaten egg or milk to give a glaze.

Fish Salad

Arrange cooked fish in the centre of a serving dish on a bed of shredded lettuce and surround it with sliced cucumber and quartered tomatoes. Serve it with a good, sharp salad dressing.

Sauces to Serve with Fish

Hollandaise Sauce

2oz. of butter
1 tablespoon of vinegar
2 tablespoons of water
Yolks of 2 eggs
1 teaspoon of lemon juice
Salt, pepper, and cayenne pepper

Put the water, vinegar, and egg yolks into the top of a double boiler over hot water and heat them, stirring constantly until the mixture thickens. Take it from the heat and add the butter in small pieces, letting each piece melt before adding more. Add the lemon juice and seasonings. Do not boil the sauce or it will curdle.

Mustard Sauce

1oz. of butter
1 teaspoon of flour
1 teaspoon of dry mustard
2 teaspoons of vinegar
½ pint of water or liquor from boiled fish
Pinch of salt

Melt the butter in a saucepan and add the flour and mustard. Remove the saucepan from the heat and add the liquid, mixing carefully. Heat the sauce to boiling, stirring constantly and cook it for 3 minutes. Add the vinegar and salt.

Egg Sauce

1oz. of butter
1½oz. of flour
½ pint of milk
Salt and pepper
2 hard boiled eggs, chopped

Melt the butter, stir in the flour, and add the milk gradually, stirring constantly until the sauce is thick and creamy. Stir in the finely-chopped eggs; chopped parsley, chives or a mixture of both may be added if desired.

Brown Butter Sauce

2 tablespoons of butter
2 tablespoons of flour
½ pint of milk
Salt and pepper

Heat the butter until it is browned, add the flour carefully, and heat the mixture until it is lightly browned. Stir the milk in by degrees and cook the sauce until it is thickened and quite smooth.

Lemon Parsley Butter

3oz. of butter
Juice of ½ lemon
1 teaspoon of chopped parsley
Salt if necessary

Soften the butter until it is creamy, add the lemon juice by degrees, and mix in the parsley and salt if needed. Form into balls.

ROYAL VISITORS TO NEW ZEALAND

IN the first three articles in this series Enid B. V. Phillips described the visits to New Zealand of H.R.H. Prince Albert, Duke of Edinburgh, T.R.H. the Duke and Duchess of Cornwall and York, and H.R.H. the Prince of Wales. This article describes the tour of the next Royal Visitors to New Zealand.

The Duke and Duchess of York

H.M.S. Renown returned to these seas 7 years later when she brought the Prince's brother, the Duke of York, and his sweet-faced Scottish Duchess to the most distant of the King's Dominions. One of the first things they did on the day of their arrival was to visit the elderly folk at the Auckland Infirmary, where the Duchess was presented with a bouquet by Mrs. McIntosh, aged 85. They made a pleasing picture, the dark-haired little Duchess in delphinium blue and the black-bonneted old lady wearing a snowy apron over her widow's weeds. The oldest inmate was 93, and, though confined to bed by infirmity, there was nothing enfeebled about the handshake she gave the Duke and Duchess—to their surprise she had "a grip like a champion wrestler!" Their Royal Highnesses also called at the Disabled Soldiers' Home, and as they were leaving the Duchess was invited to look at the twin occupants of the pram which had been wheeled into the forefront of the crowd surrounding their car. She immediately drew the Duke's attention to the babies, who slept blissfully on quite oblivious of the attention they were attracting.

Children's Demonstration in Auckland

The Royal visitors' desire to see as much as possible of the children throughout New Zealand, coupled with the request that they might everywhere be granted a holiday at some time during their visit, met with a wholehearted response from the rising generation. At the children's demonstration in Auckland they were greeted by hundreds of schoolgirls in white dresses and hoods who formed the Maori word for welcome, "Haeremai." Later thousands more joined in the evolution of the Cross of St. George. After the march past of the Boy Scouts and the Girl Guides it was the turn of the Brownies, each pack being harnessed together with red ribbons and going by "at the trot." The two tiniest Brownies, from the Richmond Orphanage, had been chosen to carry between them to the Duchess a big box containing a doll for the Princess Elizabeth. The doll-baby's lovely, long robes had all been made by hand—truly a labour of love—and a complete set of "short" clothes had been provided as well. The box was prettily decorated in the Duchess's favourite colours, pink and blue. Her Royal Highness was so fond of these shades that she even had some of her footwear dyed to match her various ensembles in these tonings. Her wardrobe included street shoes of bois du rose and sandals of soft blue kid; pink satin dance shoes with diamante and ruby-encrusted heels; blue satin evening shoes that had the vamp outlined in pearls and turquoise, and the palest peach-coloured pair with glittering, pointed buckles. Her mules were the most exquisite cameo pink creations adorned by clusters of chiffon flowers, and even her slippers were trimmed with Beauvais embroidery in a rose design.

Among the gifts the Duchess received from the chiefs who had come all the way from the Cook Islands and Western Samoa especially for the celebrations was a tortoiseshell ring inlaid with silver fern leaves and a flower called tiare Maori which is worn as an ear ornament by the Cook Island women.

(Rumour has it that the good housewives of Auckland declared holiday for the nonce and flocked to the festivities in such numbers that the butchers complained that their succulent sirloins stayed in the shops during the period of the Royal visit, the menfolk apparently being regaled with salads and ham from the delicatessens!)

T.R.H. the Duke and Duchess of York.

Fishing Trip to Russell

As a prelude to their North Island tour Their Royal Highnesses had a 2-day fishing trip to Russell, where the Duke caught a fine raremai shark and the Duchess, fishing with handlines from the launch, secured a larger catch of snapper than the Captain of the Renown. She also viewed the camp belonging to the American author and deep-sea fishing expert Zane Grey, and on the return trip steered the launch through the heavy seas.

Pukekohe was the first halting place on their train tour through the island, the 6-year-old granddaughter of the late Premier Massey presenting flowers to the Duchess. At Hamilton the Girl Guides had brought their mascot, a handsome collie, to meet the Royal vice-president of their movement, Her Royal Highness pausing to give him an approving pat. On their way back to the station the Duke and Duchess made an unscheduled stop at the Soldiers' Memorial Park beside the tranquil, dark-green waters of the Waikato River, and the Duchess in one of those characteristically spontaneous gestures which so endeared her to the people reverently placed her bouquet at the base of the cenotaph.

Sir Maui Pomare did the honours at Rotorua, where the tribes had gathered to pay homage to Royalty, and in their poetically-phrased address of welcome beginning: "Seek them from the far horizon and draw them thither," the Duchess came in for special mention: "Daughter of an honoured House, welcome! Welcome! . . . Is it a woman's peace you bring? Woman's hands and woman's tears have soothed the wounds of a warring world. Now woman strives for the peace of God, an enduring peace, the peace which passes all understanding. Welcome then, embodying the ever-recurring hopes of mankind for a state in which health, happiness, and prosperity shall prevail. There are ruined homes to be built again; there are broken hearts to be mended. There are empty places to be peopled; there are waste places to be turned into gardens. Come, then, with the Empire's call to all your kind, to cement its foundations anew in seriousness, with patience and forbearance."

As the magnificent demonstration of poi dances and hakas drew to a close the Duke and Duchess mingled with the performers, asking many questions which evidenced their intense interest in all they had witnessed.

Joys of Tent Life

At Tokaanu Their Royal Highnesses tasted the joys of tent life, camping in a little clearing amid the tall kahikatea and kowhai trees beside the jade and silver torrents of the Tongariro River. Here in this idyllic spot there was not even a telephone to intrude upon their peace, the wireless being their sole link with events in the outside world. The Duke took full advantage of this short respite to try his luck with the rod, proving himself a first-class angler. The Duchess, too, donned workmanlike waders and waterproof and on the second day secured a trout weighing only half a pound less than the Duke's largest prize, thus showing she was no novice at the gentle art. Needless to say, rainbow trout had pride of place on the Royal menu at Kowhai Camp.

Now their travels began in earnest. The Mayor of Stratford made history when, after the usual cheers had been accorded Their Royal Highnesses, he called for "Three more for the baby at home," a proceeding which so pleased the Princess's parents that it subsequently became part of the programme in other towns. The main street of Hawera was lined by schoolchildren holding aloft arches of white roses to form a canopy of fragrance over the Royal couple as they walked back to the train. The white rose of York was again to the fore at Wanganui, but this time there was one gigantic bloom only, close on 1000 girls in white composing its petals and a golden-frocked group its centre.

The Duke was so keen to inspect the Bunnythorpe Dried Milk Factory that he motored there and back from Palmerston North before breakfast, and even at the end of the long day, which included four civic functions (at one of which he comforted a small boy who was shedding tears "because he didn't think he was going to see the King") as well as a long train trip, he still had enough energy left to play several strenuous sets of tennis at the Napier Club's courts. Hearing that some patients from the Pukeora Military Sanatorium would be down at the railway line to wave their greetings, Their Royal Highnesses sat one on each side of the carriage, keeping a sharp lookout so that they would not miss the waiting men as the train gathered speed across the plains. At Woodville they had a long chat with an ex-sergeant of the Black Watch who had formerly worked at Glamis and was serving with the Duchess's brother, Captain Bowes-Lyon, when he was killed at Loos; and in Wellington Her Royal Highness received another unexpected reminder of the ancient Scottish castle that was her girlhood home when an onlooker among the cheering crowd called out, "Hurrah for Glamis!"

Capitalising Wellington's reputation for wind, 4000 children forming the Union Jack at Newtown Park caused the "flag" to ripple realistically in the breeze, a difficult feat achieved by means of knee-bending by sections. The biggest children's gathering of all was held in Parliament Grounds, Sheila Coates, the schoolgirl daughter of the Prime Minister, presenting the Duchess with a bouquet. Their Royal Highnesses carried out a tour of inspection to a ceaseless accompaniment of cheering and as the youthful Wolf Cubs caught sight of the smiling little Duchess whose dainty hat and coat matched the delicate wild-rose colouring of her cheeks, they threw their caps high into the air so that for a few moments it seemed as if a myriad green leaves had been sent swirling by a sudden wind. When Their Royal Highnesses took their departure sundry small boys surged forward and sought to assist the car's progress down the winding drive by clinging to the mudguards.

Opening of Karitane Home

The Duchess was all in pink, too, even to her parasol, the day she performed the opening ceremony of the new Karitane Home which had been erected on Melrose Heights. Her simply-cut georgette frock was a soft shell-pink shade and she wore two long ropes of lustrous pearls, the pink tulle brim of her crinoline straw hat being caught back from the face by a diamante brooch. Karitane nurses formed a guard of honour for the Duchess as she opened the main door of the building with a gold key which had been presented to her in a polished rimu casket. She spent a happy half hour admiring the babies and discussing mothercraft methods with the nurses before visiting the residence of Sir Truby King, the founder of this world-famous system of infant welfare. His daughter Mary and a helper ran a small kindergarten at the house and the Duchess was most interested in the activities of the toddlers, who were quite at home with the Royal visitor. "I've seen such lovely babies here," she remarked as she was leaving. Perhaps this brief interlude with these small folk assuaged in some measure her longing for her own little golden-haired daughter whom she had left be-

The Duke of York landing a shark during his sojourn at Russell.

The Duke and Duchess arriving in Wellington after travelling from Masterton by train.

hind in England in the Queen's good care.

Meanwhile the Duke, a keen student of industrial conditions, had driven out to the garden suburb of Lower Hutt to see the houses the Government had built under the Workers' Settlement Scheme. He himself selected the homes he wished to visit. Imagine the occupants' surprise, on answering the knock, to find His Royal Highness the Duke of York on the doorstep! But his warm handshake and friendly manner at once put them at ease and they were soon chatting freely. His host in one house was an Imperial ex-serviceman who had emigrated to New Zealand only 4 years before after a long period of unemployment at Home. On his way back to Wellington His Royal Highness called in at the Petone Woollen Mills, where he was asked to accept a brown and orange-banded travelling rug, also one for the Duchess, and a pair of soft white cot blankets for the Princess Elizabeth.

Blenheim's Welcome

Blenheim heralded Royalty's arrival with the stirring music of the bagpipes, the Scottish band being arrayed in all the glory of the MacIntosh tartan; and Nelson's demonstration was distinctive by reason of the sweetness of the children's singing, which was entirely unaccompanied. A little bunch of wild flowers wrapped about with a slip of paper bearing the childish scrawl: "God Bless the wee Baby Princess" was thrown into the Royal car by a small girl just as Their Royal Highnesses were nearing Nelson. The Duchess so appreciated the child's gift that she was still holding the little posy in her hand when she alighted to take her place on the dais erected near the Cathedral steps. The Cathedral itself, a timbered structure, was in the course of demolition, a marble edifice being designed to replace it. The Nelson children were particularly privileged, because it was their own special gathering, held on the sunlit sward of the Botanical Reserve, at which the Duchess made her last public appearance in New Zealand, for later that day she was taken ill with tonsillitis, necessitating the cancellation of all her engagements, and the Duke had to continue the tour alone.

At Murchison he was able to talk with the Duchess by private telephone and received reassuring news of her progress. The Royal cavalcade set such an excellent pace through the Buller Gorge that they were soon ahead of schedule and the Duke stopped in the lower valley to sample the big, luscious blackberries growing beside the road. He travelled back from Greymouth to Christchurch by train, taking over the controls of one of the two electric engines through the 5½-mile long Otira Tunnel, and then driving the steam locomotive "Passchendaele" (a memorial to the New Zealand Railways men who gave their lives in the Great War) for the 15 miles to Cass. At Moana station, where the train stopped for water, there were three sets of twins, their ages ranging from 6 months to as many years. His Royal Highness's secretary gave one of the babies a flag, whereupon the Duke, wise in the ways of children, declared that they must have one each and, sending his secretary for a further supply, promptly presented the other infants with a flag apiece, Albert, the most aggressive member of the sextet, waving his newly-acquired possession so vigorously that he hit his twin on the head.

In Christchurch the life membership badge of the Returned Soldiers' Association of New Zealand was bestowed upon the Duke and he was accorded a terrific ovation at the close of his impromptu speech and literally "chaired" to his car by his companion "diggers." He was equally popular with the nurses at the Christchurch Hospital, where, on behalf of the Duchess, he laid the foundation-stone of the memorial chapel to the nurses who died in the war. Before leaving Christchurch the Duke received the Moriori "King," Tami Solomon, who had made the 500-mile journey from the Chatham Islands, home of the last remaining descendants of New Zealand's earliest inhabitants, to express his loyalty in person.

Statue Presented to Dunedin.

At Dunedin the Duke opened the new Art Gallery in Logan Park and presented the city with a bronze statue of St. George, a symbol of the British Government's share in the recent Dunedin Exhibition, which had been such an outstanding success. The undergraduates of Otago University made him a life member of the Students' Association, initiating him also into the lighter side of University life before attaching ropes to his car and hauling it bodily for some distance when he left. The ancient barrel-organ in the Early Settlers' Museum was again brought out of obscurity to encounter a brief season of fame by its somewhat reluctant rendering of "O

ROYAL VISITORS . . .

Come, All Ye Faithful" when the Royal visitor took upon himself the unaccustomed role of organ-grinder.

The Duke encountered his first New Zealand snowstorm in the Southern Lakes district, and although his search for gold in some of the old workings beside the Kawarau River was unrewarded, he later received from a little Queenstown girl a silver case containing a gold nugget which had been found in the locality of the township. Some of the children had travelled up to 100 miles to see him and the colourful "tea-cosy-shaped" hats worn by the schoolgirls gave a gay touch of carnival to the wintry scene.

Despite the sleet which swiftly turned the grass before the Royal dais into a swamp, 7000 children participated in the march past at Victoria Park, Invercargill. Their delight knew no bounds when the Duke, after accepting their gift of a doll and cot for his baby daughter, solicitously tucked the doll into the cot with a deftness that would have done a Plunket nurse credit.

Foveaux Strait so lived up to its reputation of being the world's roughest strait that the light cruiser Diomede was unable to put to sea, so the Duke had to abandon his plan to cross to Stewart Island, the Rakiura—"isle of glowing skies"—of the Maoris, and rejoin the Renown in Paterson Inlet. At least one Stewart Island resident met the Duke, however, having represented his tribe at the Rotorua hui, where he was the proud recipient of one of the silver-topped walking sticks His Royal Highness presented for distribution among the principal chiefs. Eventually the Renown anchored safely in the North Channel about two miles from Bluff and the Duke and his party left by the Harbour Board tug. The transfer from the storm-tossed tug to the Renown required careful timing as well as considerable agility. Nevertheless, it was accomplished without mishap, much to the relief of the Duchess, who, now quite well again, was an interested spectator aboard the Renown.

At the conclusion of Their Royal Highnesses' New Zealand and Australian tour there was said to have been 3 tons of toys in the Renown—

I saw a cruiser steaming across an English sea,
And oh! it was all laden with pretty things for thee;
There were tea-sets in the cabin, and blankets in the hold,
A Noah's ark with wallabies, a porringer of gold.
I saw a cruiser homing; no battle-cruiser bore
Such freight of baby baubles for a pretty maid before—
Such dolls with dainty finery and little shoes and socks,
And tiny carven furniture, and trunks to hold their frocks. . . .
I saw a mother dreaming, a-dreaming o'er the sea,
And oh! her heart was laden with pretty thoughts of thee;
She brought a store of lovely toys that cost her half a year
Of baby ways and nursery days, and oh! the price was dear.

A Set of Dressing-table Mats

MADE with artificial silk stitching thread on a simple frame of wood, this set of mats gives an attractive finish to the dressing table.

FOR the square mats the frame should be of four pieces of wood 10½in. x 1½in. x 1in. made into a square with mortise and tenon joints. On the frame draw a 9in. square and drive in 1in. nails every ¾in., making 13 nails on each side.

Allow 30 reels of thread in the desired colour and use four reels at a time. Knot the ends securely on the third nail along from the top left-hand corner to the corresponding nail at the bottom left-hand corner. Wind the threads firmly five times around these two nails, carry the threads to the next nail, and wind over this pair five times. (The "five-times winding" is the stitch.) Repeat the stitch once more. Next, miss three nails and repeat the winding on the next three. Repeat the whole process on the opposite sides of the frame (Fig. 1). The threads should now be on the third nail up from the bottom left-hand corner.

Wind diagonally to the right over five pairs of nails and repeat to the left (Fig. 2). The threads should now be at the third nail down from the top left-hand corner. Miss two nails and start on the third (the sixth nail from the corner). Wind as shown in Fig. 3. Take the threads to the centre nail, wind them diagonally to the centre nail on the next side, and then wind as shown in Fig. 4. This finishes the winding.

Turn the frame back to front for sewing up on the wrong side. Thread a needle with a contrasting colour, and pull the thread double and knot it. Start at the top left-hand corner and work round the square.

Insert the needle at 1, as shown in Fig. 5, and withdraw it at the same number. Loop the thread over the needle and pull it tight. Repeat this at 2, 3, and 4, and then carry on to the next square. Continue round the frame to the centre. Do not sew up the diagonal cross in the squares.

To finish off cut the strands as close to the nails as possible; a razor blade is ideal for this. When it is free from the frame, comb out the ends of the mat, lay it flat on a board, and cut the ends to the required fringe with a steel ruler and razor blade. Take care that the strands do not slip under the ruler.

The long mat is made on a frame five times as long as the frame for the square mats, but is formed in exactly the same way.

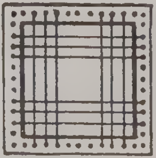


Fig. 1.

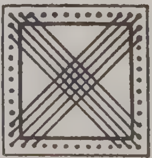


Fig. 2.

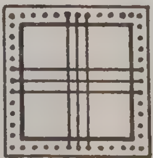


Fig. 3.

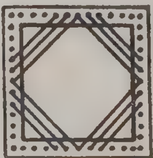


Fig. 4.

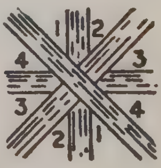


Fig. 5.

LOOSE COVERS FOR FURNITURE

LOOSE covers can wake up tired furniture, protect a new upholstered suite, or completely alter the decoration and colour scheme of old furniture and give outworn and outmoded articles a new lease of life. In fact, whether the home is new or old, loose covers are an asset, and not only can they enhance heavy upholstered furniture for living rooms, but smaller chairs for bedrooms, sunporches, and kitchens gain colour and attraction when dressed in loose covers. Instructions for their making are given in this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland.

LOOSE covers take time, money, and work to make, and probably will have to last for some years, so the choice of material and colour or pattern should be considered carefully. Good material is the foundation of a successful loose cover, and time spent in searching for the most suitable fabric for the particular piece of furniture will not be wasted.

Buying loosely-woven, cheap materials is never wise, for as well as being very difficult to make into good-looking covers, they wrinkle or stretch in wear, very soon become shabby at the edges, and do not repay the work and time spent on them. Fabric for loose covers should be firmly woven so that it will not pull out at the seams or let dust through. It should also be washable or suitable for dry cleaning.

Whether to buy patterned or plain material is always a matter for individual consideration, and a decision depends on the type of furniture and the other furnishings in the room for which it is needed. Where there is already a considerable amount of design in the living room in the floor coverings, walls, or curtains, a plain or self-patterned material is a happy choice, and even a welcome relief, if the furniture to be covered is bulky. On the other hand, if walls, floor, or woodwork are in plain colours, and perhaps a little dull or uninteresting, patterned loose covers will add life, colour, and charm to the room.

However, plain, light-coloured materials show marks, and where there are young children, and consequently much use and rough treament, it is as well to choose a firmly-woven material with a neutral background, printed in a close design of many colours, which will harmonise with the other furnishings in the room. For small rooms patterned material should not have too big a design; larger rooms need the bolder, more important patterns and fancy-weave materials. In bedrooms chair, sofa, or box ottoman covers can be lighter and more delicate in tone and design, and for kitchens and sunporches the covers can be frankly gay and colourful.

If the aim is to disguise the shape or size of a chair or settee, light colours and small designs make the piece of furniture look larger; dark colours and large patterns make it appear smaller; vertically-striped covers give height and slender lines, and horizontal stripes give a lower and wider appearance. The very large designs are not suitable for small chairs unless one complete motif can be used in the back and seat; moreover, such materials are uneconomical in cutting out, as the patterns must be matched and centred, often causing a great deal of waste.

Unless the room is to be decorated completely, the cover material should blend with some other colour already used. Plain covers can repeat one of the colours in the floor covering or curtains, and patterned material should include some matching colours in the design. The aspect of the room also influences the choice of colour. If the warmer colours such as wine, plum, deep rose, red, orange, rust, or henna predominate in a room on the southern side, the room will appear warmer, whereas a room with a northern aspect can stand a larger proportion of cool colours—greens, blues, pale yellow, and ivory. Combining both cool and warm colours in one room usually gives a good effect, but the aspect determines the proportions used.

Types of Material

Linen was once the inevitable material for loose covers, but now the choice is wider and many closely-woven,

---

Heading photograph by Sparrow Industrial Pictures Ltd.

MEASURING FOR LOOSE COVERS

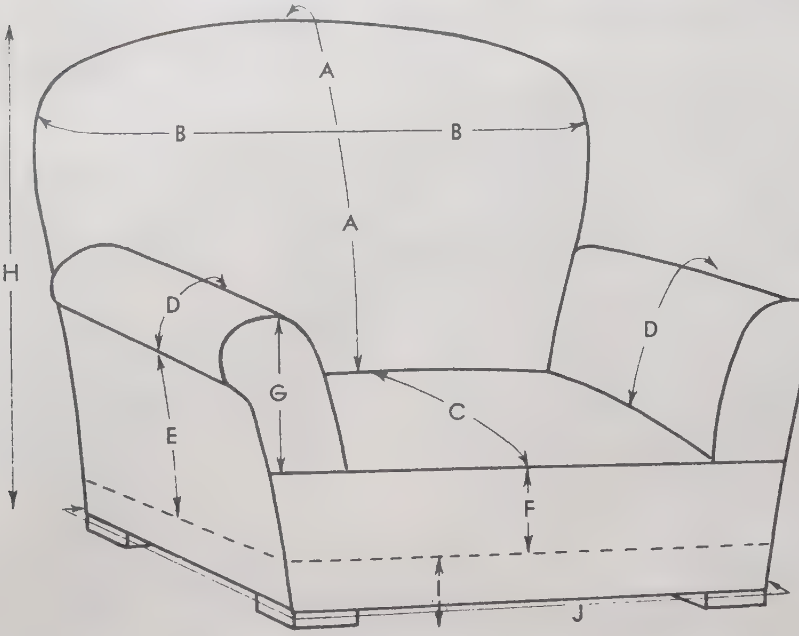


Fig. 1—Where to take measurements.

A—Length of inside back from over top roll to seat.
B—Width of inside back (to check measurement against width of material).
C—Depth of seat.
D—Length of inside arm from over arm roll to seat.
E—Length of outside arm from under arm roll to point where valance joins.
F—Depth of front band.
G—Length of front arm panel.
H—Length of outside back.
I—Depth of valance.
J—Distance all round chair (to check number of widths of material required).

If no valance is required, take the measurements E, F, and H from the top edges to the base of the chair and add 6 to 8in. for underlap to tie under the seat.

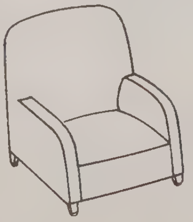
hard-wearing fabrics are used. Cotton goods such as cretonne, rep, chintz, drill, and casement cloth are very suitable, and for porches and kitchen-living room furnishings even that hardy perennial gingham is pressed into service. It may not have such a long life as the linens and heavy cottons, but if a good quality is selected, it makes very satisfactory and attractive covers which bear repeated visits to the wash tub—a great advantage in covers which have to withstand constant hard wear. Further, the price is reasonable, so a new set of covers does not make a big hole in the housekeeping allowance.

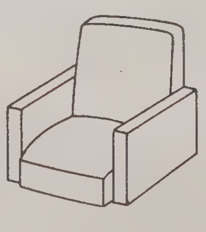
Damask weaves and other self-patterned fabrics are also much used, and twill cottons, being firm and easily laundered, are another good choice.

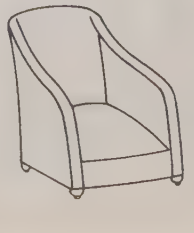
Material Required

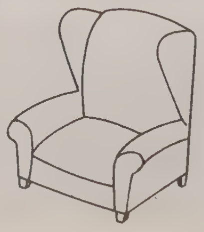
Easy chairs and settees are the furniture for which loose covers are most often required, but many other pieces can be given loose covers, so bringing a co-ordinated scheme into a room which otherwise might appear haphazardly furnished. Even easy chairs vary in shape, so it is not possible to give exact amounts of material required or cut-and-dried directions for fitting and making the covers, as any diversion of shape must be studied. The directions given are for the chair illustrated. Though the general procedure is similar for any cover, varying details in the construction and shape of the piece to be covered must modify the work. Some of these variations are sketched.

The piece of furniture to be covered must be measured carefully before the material is bought so that sufficient is obtained to cut out all parts, including bias-cut bindings for seam pipings, and the flounce or valance if the cover is to be finished in this way. Allowance must also be made for generous seams and plenty of tuck-in at back, arms, and seat. These are the measurements from which the amount of material for a chair can be estimated; Fig. 1 shows the parts of the cover and the points to measure:—









1. Inside chair back, from just over the edge of the back to the point where back and seat meet, plus 6 to 8in. for tuck-in.

2. Depth of seat from front to back, plus 6 to 8in. for tuck-in.

3. Inside arm, from over the padded roll to the seat; add 6 to 8in. for tuck-in and double the length to arrive at the amount needed for both arms.

4. Depth of the front band (sometimes called the front panel or the apron).

5. The length of the outside back of the chair from the point where the top inside back measurement was taken to bottom of chair.

6. From under the padded arm rest to the bottom of the chair; twice this length is required.

7. The front of the arms, twice.

8. 1yd. extra for bias bindings if the seams are to be piped.

9. Round the bottom of the chair and the depth of valance to be made, allowing twice the length if the valance is to be box pleated or 1½ times if it is to be gathered.

10. Width of chair back and width of seat; except for very large chairs the single width (30 to 36in.) material is sufficiently wide to cover the chair measurements.

Usually it is not necessary to add all these lengths together to arrive at the amount needed, as 4 and 7 may be cut from odd pieces of material. The measurements from a large easy chair and the methods of calculating the total length of material required are given as a guide in the table on the opposite page.

Using plain material or a patterned fabric of medium to small design 8½yds. of 30 to 31in. material would be sufficient to cover a chair of the dimensions given. If the material is 36in. wide, 8yds. would be enough, as the front arm panels would be cut from the sides of the material for the valance before the 9in. strips were cut. On the other hand, if the design is very large, or composed around a big central motif, up to 1yd. extra may be needed so that the design can be placed centrally and matched at various points on the chair.

Making the Pattern

Though experienced workers cut the material on the chair, the home sewer is much wiser to make a pattern from brown paper, calico, or old sheets. Newspaper is not suitable because it tears too readily.

Inside back: Mark the centre of the back and seat of the chair with a chalk line or a row of pins, then take a sheet of paper and pin it close to the centre line at the back. Pin along the top edge exactly where the seam is to lie. Pin up the side. Make folds at the corners of the top curve, pinning in darts. Set pins to follow the curve where the arm joins the back. With chalk or a pencil, mark the lines for cutting the pattern, using the pins as a guide. Cut the edges of the paper, leaving it pinned in place on the chair.

Seat: Pin paper on the seat in the same way as described for the back. Pay attention to the front edge, for there the shapes of chairs vary; some are straight, but usually the seat edge which at first sight appears to be straight will be found to have a gentle curve. Cut the pattern to fit precisely; turnings and tuck-in pieces will be left on the material, not on the pattern.

Inside arm: Follow the same procedure, paying special attention to the front of the arm where the straight edge of the material is to be joined to the shaped front arm piece. Darts will be necessary at this point, and if possible they should come at either side, leaving the top smoothly fitted (**Fig. 2**).

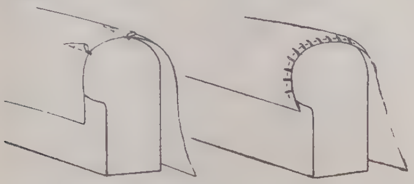


Fig. 2—Regulating the fullness at the front of the arm by darts (left) and gathers (right).

Outside arm: This piece rarely needs any special shaping, as in this type of chair it is usually rectangular. Occasionally the back line slopes a little to make the piece slightly narrower at the bottom.

Outside back: The pattern for the back should be made carefully, for it must conform exactly to the shape of the chair, or it will hang badly and may alter the set of the inside back.

Shaped front arm piece: The pattern for the front of the arm should also be made carefully, for it regulates the size of the arm covering. If it is too loose, the inside arm will tend to ride up in wear and the outside arm will then hang badly and too low, preventing a neat, tailored appearance in the finished cover. If it is too tight, a strain is imposed on the arm seams, which will pull apart in use, or it may even prevent the cover being pulled down far enough over the arms, and the corner seams adjoining the seat will also take too much strain. The shaped arm panel may reach only to the top of the front band or to the top of the valance; this is a matter for individual preference and should be decided before the making of the pattern is begun (Fig. 3).

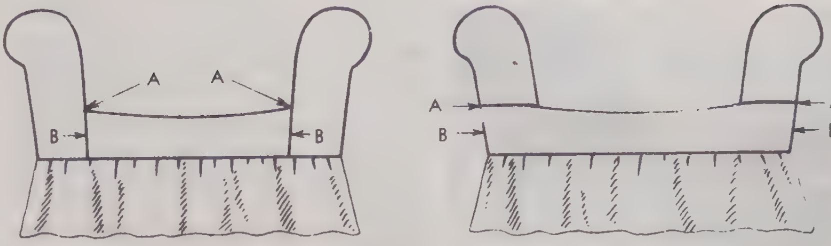


Fig. 3—Alternative ways of arranging the arm panels and front band. When tacking leave sufficient cord at A to be inserted in the front band seam at B.

Front band: A straight piece of the correct dimensions is usually required, but here again the shapes of chairs vary and the panel may require a little shaping.

Valance: No pattern is needed.

Take the paper pieces from the chair and check all edges to see that straight lines are true and curves smooth. Write the name on each piece, and mark folds, seams, darts, gathers, and any other details which will be helpful.

Cutting the Material

Place the pattern on the material and move the pieces around until the best arrangement is found, making sure the design is correctly placed on the inside back and seat and that the straight of the material runs parallel with the centre folds. The design must run from the arm top to the join at the seat on the inside arm pieces, and should correspond but be in reverse. In a small geometric or conventional design the 2 shaped arm panels probably will need to carry the same piece of design, in reverse if necessary (Fig. 4). The front band should have the design centred, and the outside arm pieces must also be alike. The outside back needs to have the centre of the design in the middle, but if the design is not correctly repeated in the length, that is unimportant.

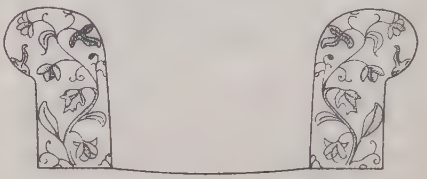


Fig 4—The 2 shaped arm panels probably will need to carry the same piece of design, in reverse if necessary.

With pencil or chalk mark round the edge of all pattern pieces, leaving 1in. turnings at the seams and 6 to 8in. at the bottom of the inside back, the bottoms of the inside arms, and the sides and back of the seat. These generous allowances are for the tuck-in around the seat, on which the wearing qualities and trim appearance of the cover greatly depend. On one side of the outside back 2in. should be allowed for the placket and fastenings.

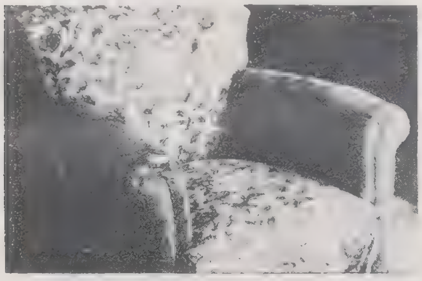
Before removing the paper pattern mark round each piece with a soft lead pencil on the wrong side of the

[*Sparrow Industrial Pictures Ltd. photo.*

Making the pattern. The chalk line marks the centre of the chair back and seat. The worn part of the seat has been patched.

CALCULATING THE MATERIAL REQUIRED

Part	Length (in.)	Width	Length of 30 or 31in. material allowed (yds.)
Inside back ..	26 + 8 = 34	2 narrow strips to be cut from other pieces	1
Seat	25 + 8 = 33		1
Inside arm ..	17 + 8 twice = 50		1½
Front band ..	9 } = 36		1
Back	27		
Outside arm ..	16 twice = 32		1
Front arm panel	18	2 from 1 width	½
Pipings			1
Round chair ..	100		
Depth of valance	7 + 2 for turnings = 9		
For a pleated valance allow 200in., about 6 widths of 31in. material			1½
		Total	8½



[Sparrow Industrial Pictures Ltd. photo.
The material set on the chair for arrangement of the design.

material; open out all folded pieces and mark corresponding sides. Mark any gathers, darts, and other construction details and write the name of each part in a conspicuous position. This labelling will be a great help while the cover is being made, for it is an unwieldy and confusing shape when off the chair.

When the material is cut out, lay the parts in position on the chair right side out so that the design can be checked again for position. See that the arm pieces (inside, outside, and panel) are pairs and that the front panel, backs, and seat carry the design the right way up. The material for bias bindings and valance are as well left uncut until this check has been made; for instance, if 2 arm pieces had been cut alike instead of a pair, a fresh one could be obtained from 1yd. reserved for bindings and the incorrect arm piece would then be used for cutting the bias strips.

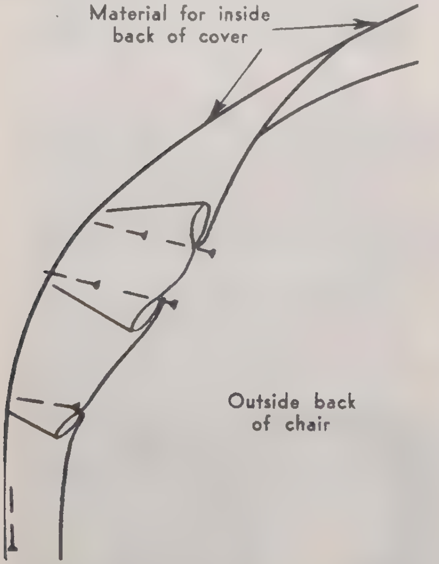


Fig. 5—Darts pinned in to regulate the fullness at the curved edge of the back.

First Fitting

Place the inside back piece in position on the chair, wrong side out, smooth out creases with the hands, and pin in any darts to regulate fullness at curves (Fig. 5). Pin the outside back to the inside back along the top seam. Set the pins on the pencilled fitting line with the raw edges sticking up for the seams. Pin a little way down the sides, leaving 2in. on the side of the outside back, which is to be finished with a placket and fastenings. Tuck in the surplus at the bottom of the inside back.

Set each arm piece in position with the seam just over the roll, pin it on the marked line to the outside arm piece, and tuck it well down at the seat. Carefully adjust the arm piece to the curved line of the back where arm and back meet. Do not make this seam too tight fitting, as the cover takes considerable strain at this point and the seam will tend to break open if it is fitted too tightly. Pin the outside arm to the outside back, again following the pencil lines.

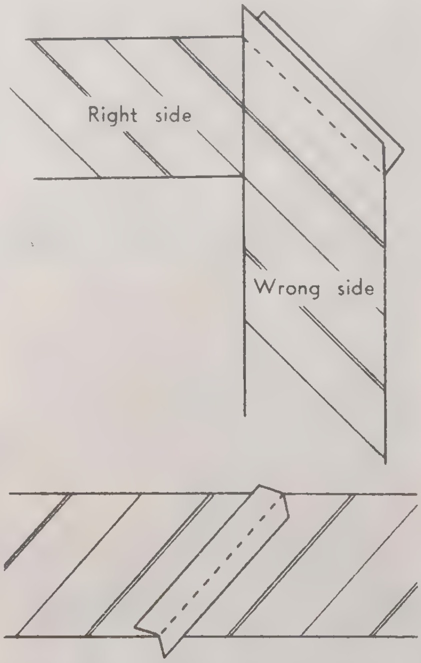


Fig. 6—The method of joining bias strips for covering the piping cord.

The front arm panels are fitted next. First make darts or gathers in the inside arm pieces to regulate the fullness evenly (Fig. 2). Take plenty of time and trouble at this point to make the darts match exactly on each arm and to have all the surplus material in the arm pieces darted neatly to fit the shaped front arm panel exactly. This is one of the important parts of the fitting and one on which the neat, tailored appearance of the finished cover depends greatly.

The front band is next pinned into place, then the whole effect should be studied carefully and any adjustments made. The curves at the top of the chair back and on front arms and seat should be checked especially thoroughly, and additional darts must be pinned in if the fit is not correct. Time spent at this stage is never wasted, and such care saves much bother and effort during the stitching and subsequent fittings.

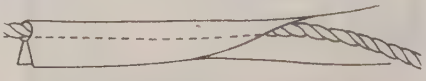


Fig. 7—Covering the piping cord.

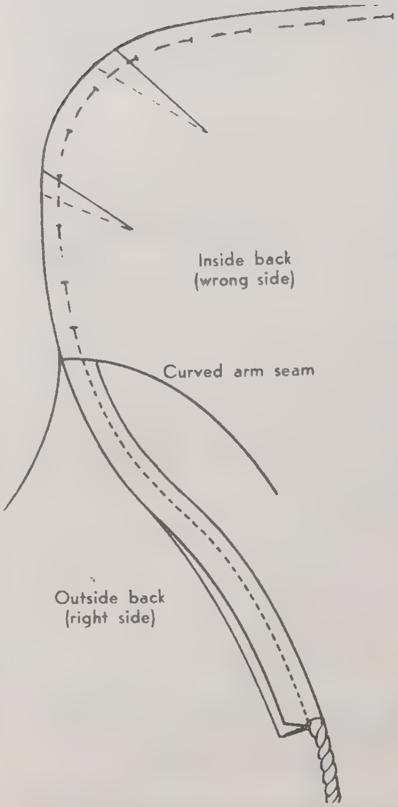


Fig. 8—Piping cord pinned into the back seam. Sufficient must be left to be enclosed in the outside arm and outside back seam.

Pull up the material tucked in and pin the joins, trimming off surplus at the back corners.

Making the Corded Piping

Leave the cover pinned on the chair while the piping cord is prepared. Note the seams which need piping and estimate the length of piping needed. Cut 2in.-wide strips of material on the true bias and be sure to make all joins on the sloping edges (Fig. 6); making them at right angles results in unsightly bulges in the corded edge.

Piping cord may now be bought at haberdashery counters, but it is still not plentiful; thick string is a good substitute if the cord is not procurable. Whichever is used, it should be boiled for a few minutes, then dried, to shrink it before it is inserted in the binding.

Keep the stitching as near the cord as possible and straight (Fig. 7). A cording foot can be bought at a sewing machine shop quite reasonably; it has only one prong and simplifies the work of covering the cord and sewing the piped seams.

MAKING LOOSE COVERS FOR FURNITURE

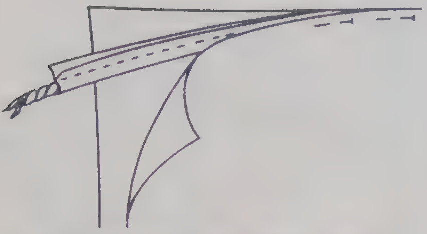


Fig. 9—Inserting the covered cord in the piped seams.

Stitching the Cover

Take the cover off the chair carefully so that the pins are not disturbed, then, starting with the back, stitch in any darts which regulate the fullness at the curves. Do not cut the darts open but press them well down with an iron. Then insert a length of covered cord between the two edges on the closed side of the back, leaving sufficient cord to join in the outside back and outside arm seams (Fig. 8). Set the cord in so that the stitching will lie exactly on the marked fitting line, pinning through the 4 thicknesses of material (Fig. 9). Carry the cord on down the inside back only, on the side which is to be fastened. Tack the outside and inside arm seam, inserting a piping cord.

Next tack the darts at the front of the inside arm. Then tack the shaped front arm panel in place, inserting the cord, and leaving lengths at the bottom so that the piping may be carried continuously across the narrow ends of the front band for whichever finish has been chosen (Fig. 3).

At this stage try the cover on the arms so that adjustments may be made before it is stitched. When the fit has been checked stitch the front arm panel seam and the outside arm seam, then continue tacking the piped seam at the front of the chair, carrying the cord across the bottom of the arm panel (Fig. 3). Tack the curved seam at arm and back junction and stitch firmly on the fitting line; snip the edges at the curve to make the seam lie flat.

Join the outside arm and outside back seam on the closed side, inserting the loose length of cord. On the open side stitch the cording in place down the inside back and outside arm. Stitch the plain seams at the seat, trimming off any surplus material at the front and back ends of the arms. Set the cover on the chair, tucking the seat piece, inside arms, and back well down. Pin the open ends together at the back and check for fit at the bottom to ensure that it is an equal distance from the floor at all points.

[*Sparrow Industrial Pictures Ltd. photo.*
The chair as it was.

Making the Valance

Join the valance lengths with flat seams and make a 1in. hem at the lower edge. If a pleated valance is chosen, set in pleats regularly and pin them at the top edge (Fig. 10). Then try the valance against the cover to decide where the pleats are to come. An uneven number of pleats across the front usually gives a better effect.

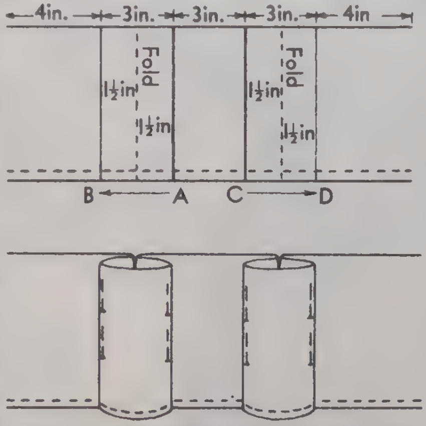


Fig. 10—Pinning the box pleats for the valance: Fold at A and pin on B; fold at C and pin on D.

Corners can be turned by a pleat or the straight material, but a better effect is gained if each corner is finished in the same way. Slight adjustments may be necessary at the folds to get the pleats in the desired places.

Gathered valances are easier to arrange. The length of material is marked in eighths and the lower edge of the cover is marked to correspond; then the fullness is evenly spaced between the marks.

The valance should clear the floor by 1in. all round. Set the piping cord in the seam attaching the valance and stitch it in place.

The Fastening

Fold in the 2in. turning at the outside back opening and sew on hooks and eyes or large dress fasteners, or insert a long slide fastener.

Sewing the cover on the chair down the open sides is quite usual and entirely satisfactory. Use a long double linen thread, and if fairly-long stitches are made to lie in the depression formed by the cord on the front, and smaller, neat stitches are taken on the fold at the back, the closing will not be unsightly (Fig. 11). The seams may be neatened inside by trimming and overcasting by hand, or they can be stitched again by machine ¼ to ¾in. from the previous stitching, then trimmed even.

[*Sparrow Industrial Pictures Ltd. photo.*
The chair with its new loose cover.

Anchoring Cover

The finished cover should be pulled into place at all edges. The tuck-in must be pushed well down; a large wooden spoon is useful to push the back corners well inside the upholstery. Newspapers rolled into long tight rolls and pushed down as far as possible at the back and the sides of the seat ensure that the cover does not ride up when the chair is used. Tapes sewn inside at the valance seam and tied round the chair legs are also useful to keep the cover in place.

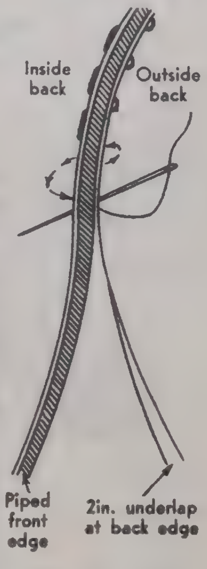


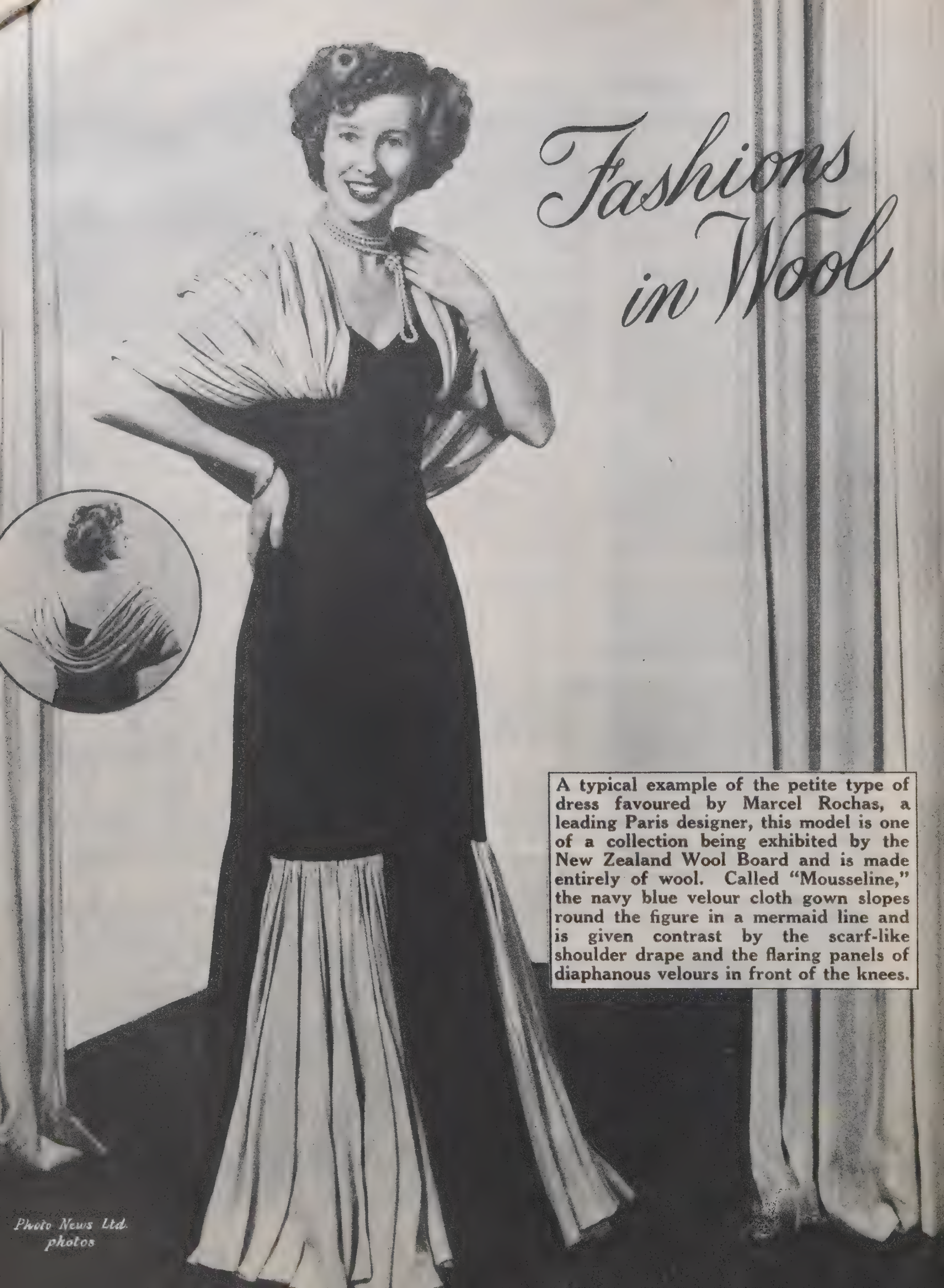
Fig. 11 — The method of stitching to close the open side of a loose cover.

Settee Covers

Loose covers for settees are made in the same way as described for chairs. Though they are unwieldy to handle and take longer to make, they are no more difficult to fit. However, one point needs careful consideration: As no material is sufficiently wide to extend the full length of the back and seat, widths have to be joined and any design or stripe must be exactly matched. Extra material is frequently necessary for this matching, and allowance should be made when the amount is calculated.

Window seat or divan bed covers are the easiest type to make, and small easy chairs without arms are the simplest type to cover; perhaps the beginner would be wise to choose one of these for a first attempt at loose covers. The older-fashioned sofa is a more difficult subject, and the wing chair is certainly not the type for a novice hand.

Fashions in Wool



A typical example of the petite type of dress favoured by Marcel Rochas, a leading Paris designer, this model is one of a collection being exhibited by the New Zealand Wool Board and is made entirely of wool. Called "Mousseline," the navy blue velour cloth gown slopes round the figure in a mermaid line and is given contrast by the scarf-like shoulder drape and the flaring panels of diaphanous velours in front of the knees.

Photo News Ltd. photos

The Choice Between Making and Buying

In her constant planning for the welfare of her family the housewife frequently must choose between making a thing herself and buying it or between doing it and paying to have it done. Such decisions, simple enough in themselves, have many implications: They involve the status of the housewife, the relative importance of time and money, the availability of labour, and the complications of the present system of production. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, describes the housewife's part in the activities of household production and the considerations which influence her when, for example, she makes a cake and buys a dress rather than buying the cake and making the dress.

SOME people find difficulty in realising that production carried on in the home is important. So much emphasis is placed now on the fact that tasks once done at home have been taken over by the factory, the service agency, and the social institution that the home tends to be thought of only as a place where the ever-increasing products of the economic system are used and enjoyed. However, this misconception is less likely to arise about farm homes, as productive activity there is both more extensive and more obvious than in cities.

Household Production

Household production has been defined adequately as: "Those activities carried on by and for the family that may be delegated to someone outside the family group, or replaced by goods bought on the market if income, market conditions, and personal inclination permit" (Hazel Kyrk in "Economic Problems of the Family.") Such production almost always is unpaid; it is directed toward increasing the welfare and enjoyment of the family by direct use or consumption and toward making the most of a limited money income, in contrast to production outside the home, which is undertaken for sale and with the object of increasing money income. In fact, the distinction is practically the familiar one between production for use and production for profit. Nor must household production be confused with domestic industry—the system common before the Industrial Revolution and still surviving today—under which workers were paid for carrying out in their homes certain manufacturing processes on materials supplied by an employer to whom the articles were returned.

Everyday examples of household production are baking, laundering, dressmaking, and looking after children. All these tasks could be done by persons outside the family circle, and in many cases the work is divided—bread is bought from a shop, but cakes are home made; "best" clothes are bought, but house dresses and children's clothes are made; parents take full responsibility for their children, but an occasional "baby-sitter" is employed.

The Home as a Productive Unit

Compared with a commercial undertaking, the home as a unit for producing goods and services has many disadvantages. It is on a very small scale. Any machinery used must be cheap, simple, and easy to operate, and even then probably will not be used to maximum capacity. An enormous variety of goods and services is turned out and work, instead of being regular, repetitive, and for limited hours, is subject to sudden crises, peaks of work, and the worker being on call, if not actively working, for 24 hours a day. Manager and worker are the same person, and the work which must be done may demand expert skill and judgment or be quite simple and menial.

Training for the task of home making comes from childhood learning in home and school. Sometimes it may arise from formal education to university standard, but the

Photograph in heading by National Publicity Studios.

[*Sparrow Industrial Pictures Ltd. photo.*
Growing vegetables at home saves money and increases the family's real income.

housewife frequently has received little such training in advance, and before her marriage may have been a highly-specialised worker in some unrelated field—for example a shorthand-typist. A farmer may marry a farmer's daughter working at home, a nurse, a factory worker, a journalist, a school teacher, or a shop assistant; all of these women with their very different backgrounds would have to adapt themselves to the domestic work of a farm household.

There is no competition for jobs—inefficient workers are not dismissed or superior ones promoted—but there are many advantages. To a point, the worker can arrange her own routine, the incentive for work is not monetary but the comfort and happiness of family members, and the reward for increased efficiency is more leisure and a higher standard of living. Research into household problems is continually in progress and an increasing fund of knowledge to simplify meal planning for good nutrition, to make bottling and jam making quick and guaranteed successful, and to explain the puzzling moods and reactions of small children is becoming available. New tools and equipment which are easy to use and save much heavy manual labour are numerous, ranging from improved tin openers to completely-automatic washing machines. The helpful services of outside experts, such as the doctor, child psychologist, home science adviser, and nutritionist, are more widely recognised.

The problem now becomes that of distributing this scientific knowledge to as many people as possible and of devising some system whereby labour-saving equipment can be made available at the period when need is greatest—that is, when the family is young and the housewife's work hardest, but when income frequently is too low for such conveniences to be afforded.

[*Sparrow Industrial Pictures Ltd. photo.*
As children grow, division of labour lightens the burden of housework.

It is extremely important for the welfare of the family that the wife and mother should not be so fully occupied with physical work that she has no time or energy left to play with the children, talk over her husband's problems, and create the atmosphere of a happy home. Conditions in New Zealand are not such that many women can turn over the active part of their duties to servants and shops, occupy themselves solely with managing and organising, and develop the characteristics of the lady of leisure.

There is also little danger that children will suffer from parental neglect of their physical welfare. However, such important things as story telling, impromptu picnics, and patient answering of questions are vital to children, but cannot be gained from an overworked housewife.

Reasons for Making or Buying

The amount and kind of household production undertaken will vary for many reasons. Some women like to sew and are clever at it, and to them time spent in dressmaking brings a double reward—they save money and have a larger and more varied wardrobe, and they obtain satisfaction in a creative activity, especially if they are able to design their own clothes. Others have special skills in cooking, in repairing things, in craft work which beautifies and adds useful articles to the home, or in improving the family food supplies by looking after gardens, orchards, hens, and house cows.

The relative quality of home-made and shop-bought articles may be the determining factor. Mother's pies are usually preferred to the baker's, but home dressmaking may not reproduce the quality of a model frock or coat. Sickness, age, or lack of physical strength may make it essential that the homemaker be relieved of heavy work by labour-saving devices or outside help. A low money income limits what can be bought and a higher one increases the number of goods and services obtained in the market. A large family adds to the volume of work to be done—the numbers of beds to make, socks to darn, and lunches to cut—but, as the children grow older, application of the principle of division of labour lightens the burden.

The homemaker's main interests may lie outside the domestic sphere—in the main farm work, in a productive sideline, or in the work for which she was trained before marriage. By using her time to add to the money income of the family, and by paying for goods and services, she may increase their real income more than if she confines herself to performing the conventional household tasks.

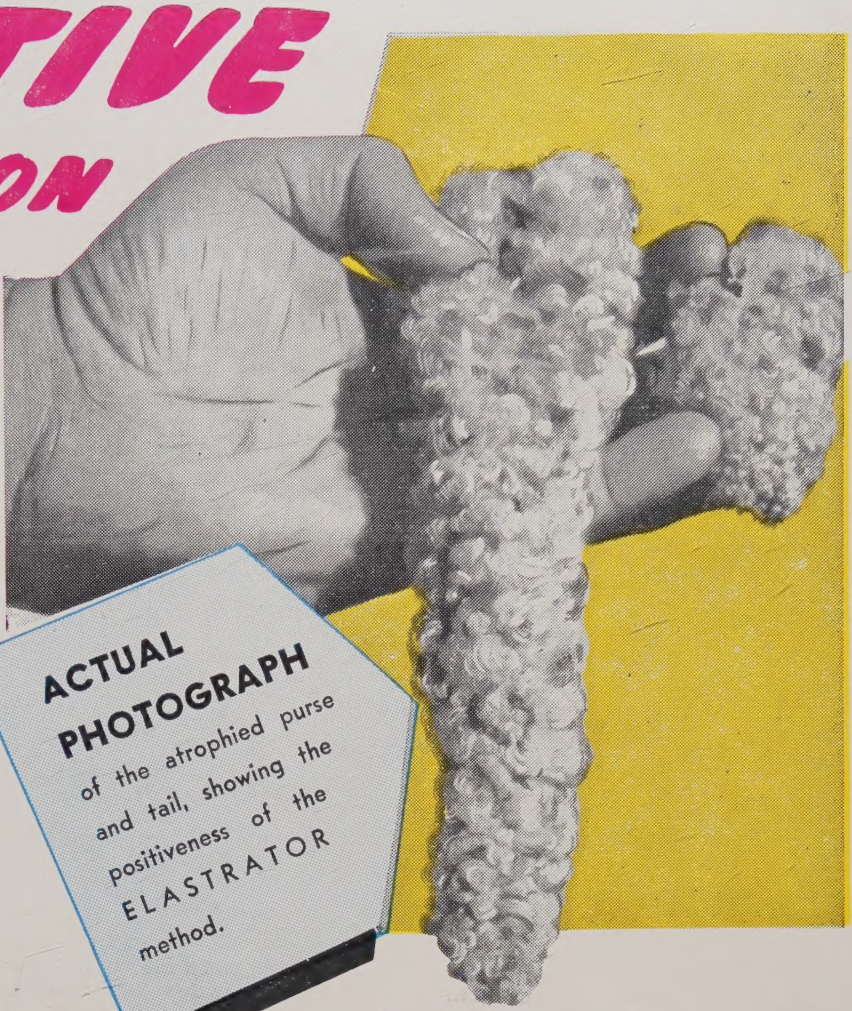
This decision is one which will be made by the individual family, for the whole purpose of household production is to increase their real income. This is done by using wisely the family resources of money income, time, energy, and skill to achieve the kind of life they wish to live. Such a standard may require a large quantity of material goods or meticulous housekeeping, or time and money to spend on hobbies and travel, and as the standard varies so will the kind and amount of household production undertaken in the home.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—27171

POSITIVE CASTRATION

by the

RUBBER RING BLOODLESS METHOD



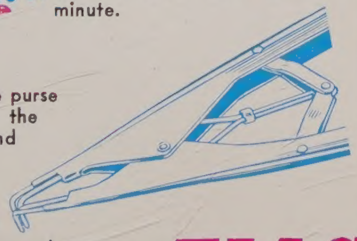
ACTUAL PHOTOGRAPH of the atrophied purse and tail, showing the positiveness of the ELASTRATOR method.

The patented ELASTRATOR instrument extends on four points a specially compounded ring, so that it may be speedily and effectively affixed above the testicles in the purse on a lamb or calf, and on the tail of a lamb. This results in stopping the circulation beyond the ring to the purse, skin and testicles and to the tail. In from about ten days to three weeks these parts atrophy—shrivel up—and fall off, or may be cut off.

Calves castrated 1 per minute

Castrate calves without the knife—and quickly, too! Stockholders report that, running them through the race in the ordinary way, calves can be castrated one a minute.

This is the modern method



The rubber ring is affixed to the purse above the testicles, stopping the circulation. The testicles and purse atrophy and fall off, leaving only a small completely-healed scar.

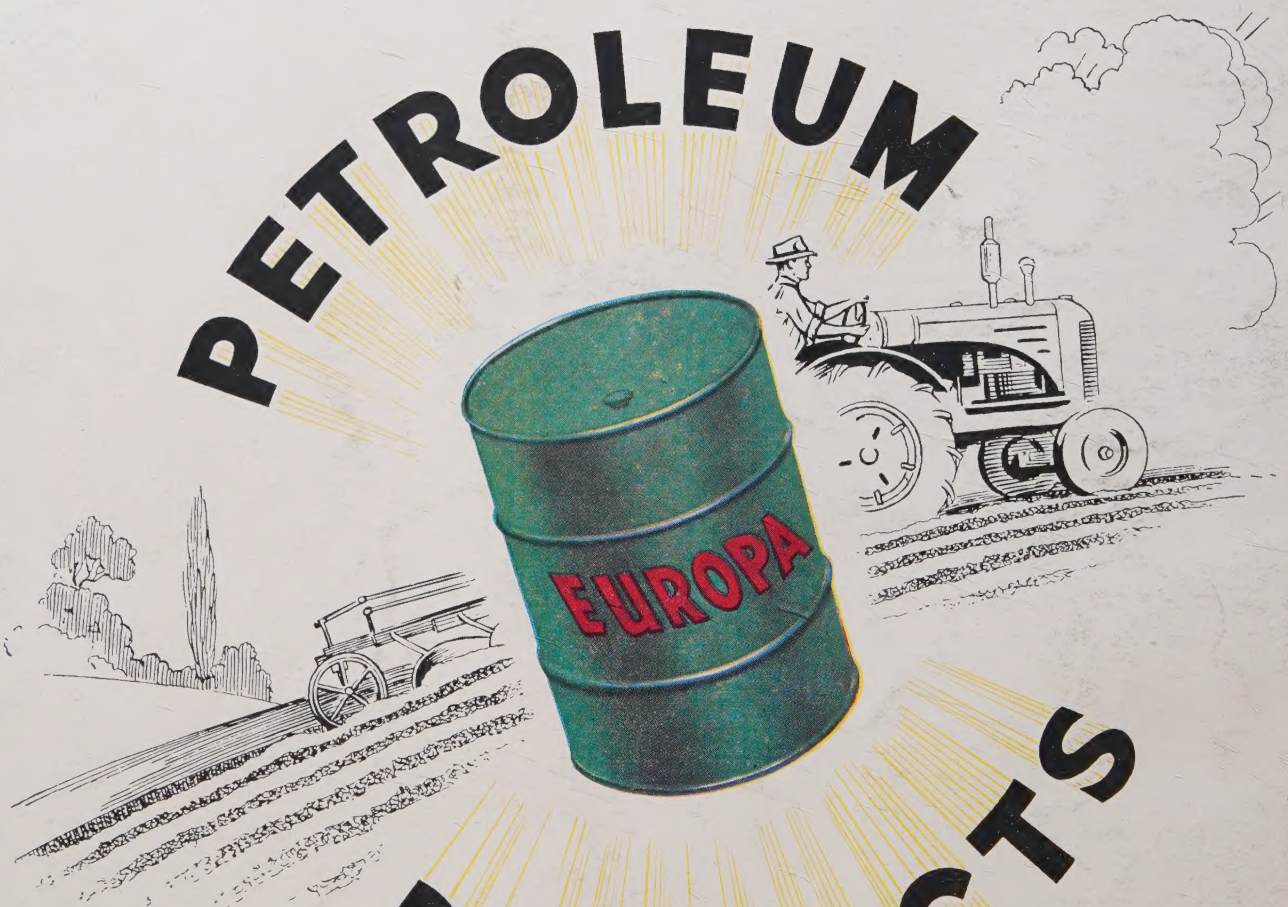
Obtainable from your Stock and Station Agents, or direct from

ELASTRATOR CO. LTD.
BOX 226, BLENHEIM.

ELASTRATOR
(REG. TRADE MARK)
CASTRATOR & TAILER

EUROPA

PETROLEUM



PRODUCTS

MARKETED BY A 100 PER CENT NEW ZEALAND COMPANY

E.F.I.